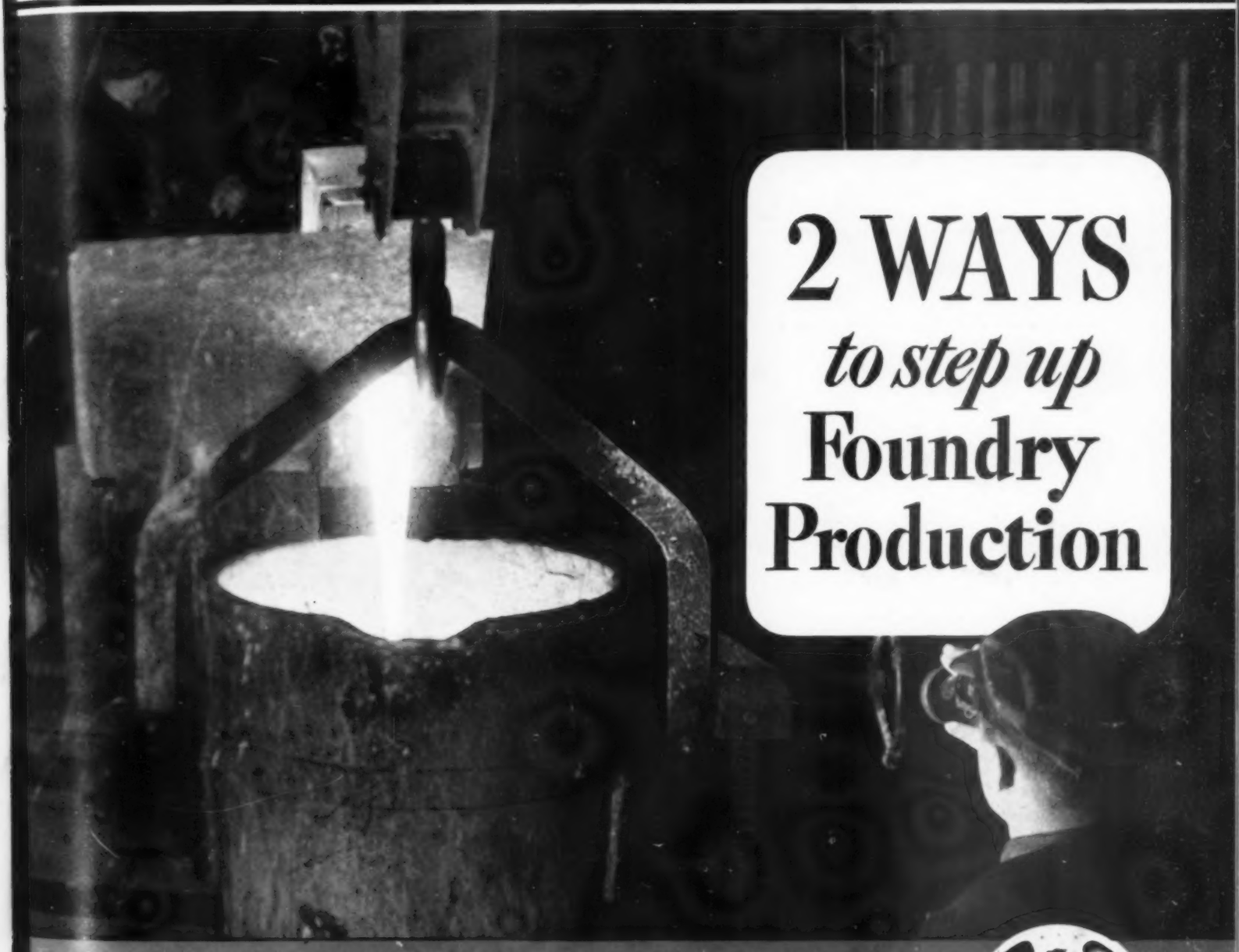
October 1942

THE FOUNDRY

FIFTY-FIRST YEAR

TECHNOLOGY DEPT.



1. USE *Republic* PIG IRON

2. USE REPUBLIC METALLURGICAL ASSISTANCE

REPUBLIC STEEL CORPORATION • General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division • Niles Steel Products Division
Steel and Tubes Division • Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

REPUBLIC STEEL
PRODUCTION FOR VICTORY

"CHATEAUGAY"
Low-Phosphorus, Copper-Free
"REPUBLIC" (Northern)
Foundry, Basic and Malleable
"PIONEER" (Southern)
Foundry and Basic

★

Also Truscon Foundry Flasks
Republic Core Wire
Foundry Nails

A PIONEER THEN—

A LEADER TODAY

IN 1892, in a Virginia valley noted for its vast deposits of pure salt, Mathieson began the construction of the first of three great factories. Over a period of half a century, they were to supply America's growing industries with vital chemicals. Today—fifty years later—the Mathieson plants at Saltville, Va., Niagara Falls, N.Y. and Lake Charles, La., are working twenty-four hours a day to supply the nation's *war* industries with the "raw materials of victory."

This is the over-all picture of a typically American enterprise—The Mathieson Alkali Works. It is a story of growth and progress in chemical research...in developing new products, such as Purite . . . and in devising more efficient methods of applying and handling alkalies.

Among Mathieson's early achievements was the development of the Castner electrolytic cell for producing chlorine and extremely pure caustic soda. The first to make bleaching powder in the United States, Mathieson pioneered the manufacture of synthetic ammonia, liquid chlorine and such outstanding chlorine products as calcium hypochlorite and sodium chlorite. Chlorine, today in great demand for war production, is also safeguarding the health of our fighting men on all fronts as calcium hypochlorite, the *mobile* chlorine carrier.

These are but a few milestones in the fifty years of Mathieson Chemicals. They are tangible evidence of the drive and initiative which have marked Mathieson's rise from modest beginnings to a place of leadership in the field of industrial chemicals.

MATHIESON CHEMICALS

PURITE

CELEBRATING 50 YEARS OF SERVICE TO AMERICAN INDUSTRY AND PUBLIC HEALTH

The Mathieson Alkali Works, (Inc.) **60 East 42nd Street New York, N Y.**

TECHNOLOGY DEPT.

PROTECT the Employee and SPEED Production—

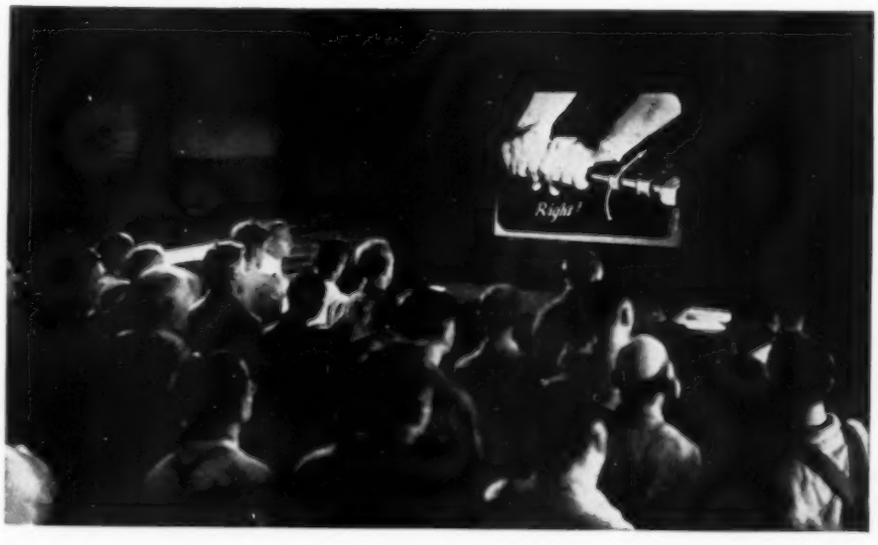
For 27 years Bethlehem has been waging war on the most dangerous saboteur of industrial production—accidents. Today, with the future of the nation so dependent upon top-speed production of war steel, we are stepping up the safety and first-aid effort on a widening scale.

First-aid instruction is being given to thousands of employees. Established safety practices are daily being intensified. More safety shoes, goggles, helmets, respirators and fire-proof clothing. More warning signs and flags to mark danger spots. More safety posters to keep workers safety-conscious. . . . No detail is overlooked which can possibly contribute to the fast, efficient, *safe* production of steel for America's ever-growing war needs.

TOE-SAVING SHOES—Each of these five steel-reinforced safety shoes saved a foot from painful injury and kept one more worker on the job, fit, and able to continue doing his share to keep up the flow of Bethlehem's war production.

DANGER SPOT—But it's been rendered harmless by a short railing and a sign. Instead of stepping out blindly from the corner of the building, workers must cross the track at a point where they can hardly fail to notice an approaching train.

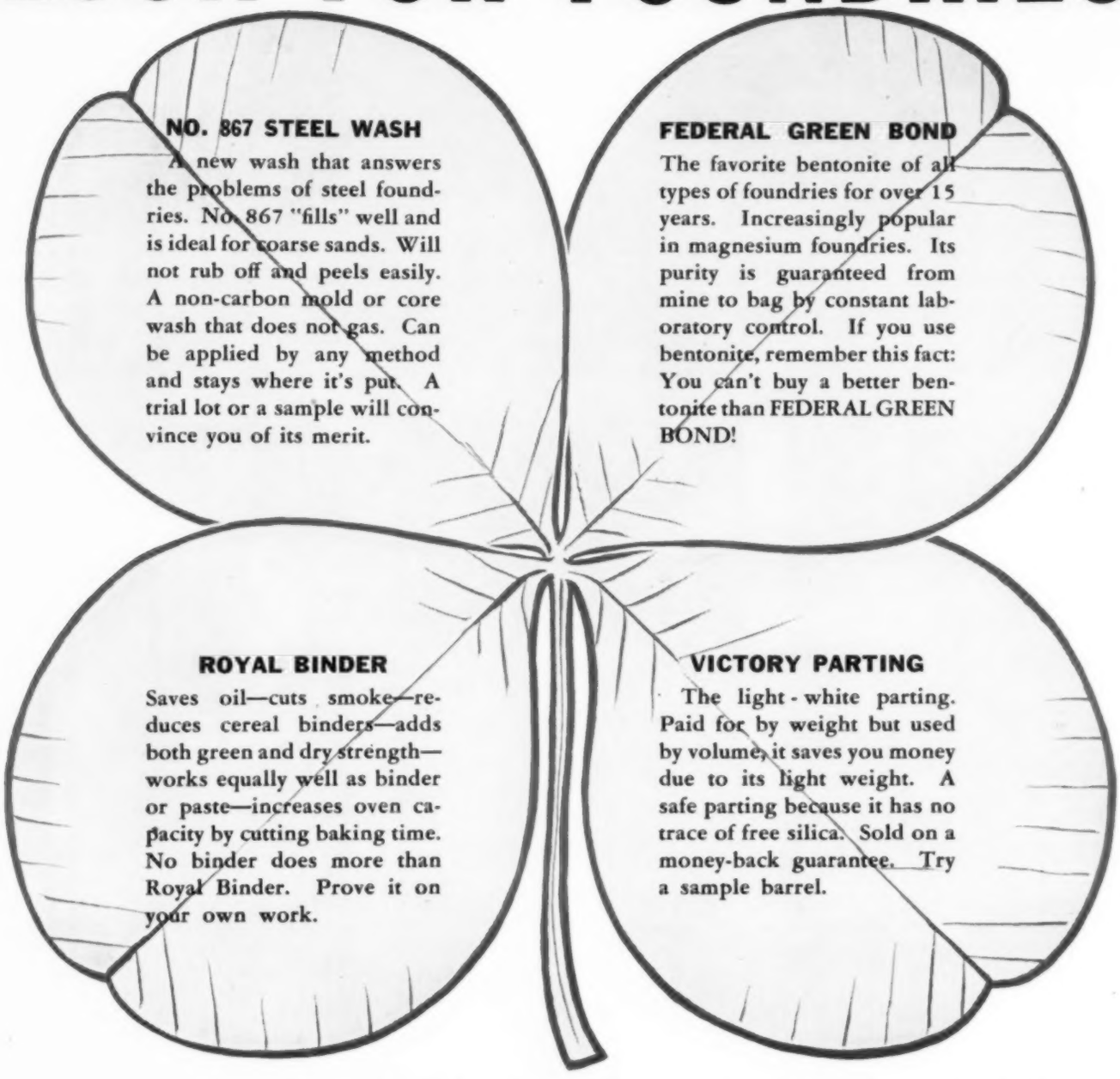
REHEARSAL—This team of first-aid men is giving treatment to an accident "victim" at one of Bethlehem's first-aid contests, held annually for many years. Thanks to this training, thousands of Bethlehem-trained first-aiders are constantly on the alert in steel plants and mines to prevent or treat industrial accidents.



BETHLEHEM STEEL

SAFETY SCHOOL—By movies and lectures, Bethlehem employees are continuously being trained in the safest, most efficient methods of handling their jobs. Year after year, this education in the safe way to do every job goes steadily forward.

LUCK FOR FOUNDRIES



NO. 867 STEEL WASH

A new wash that answers the problems of steel foundries. No. 867 "fills" well and is ideal for coarse sands. Will not rub off and peels easily. A non-carbon mold or core wash that does not gas. Can be applied by any method and stays where it's put. A trial lot or a sample will convince you of its merit.

FEDERAL GREEN BOND

The favorite bentonite of all types of foundries for over 15 years. Increasingly popular in magnesium foundries. Its purity is guaranteed from mine to bag by constant laboratory control. If you use bentonite, remember this fact: You can't buy a better bentonite than FEDERAL GREEN BOND!

ROYAL BINDER

Saves oil—cuts smoke—reduces cereal binders—adds both green and dry strength—works equally well as binder or paste—increases oven capacity by cutting baking time. No binder does more than Royal Binder. Prove it on your own work.

VICTORY PARTING

The light-white parting. Paid for by weight but used by volume, it saves you money due to its light weight. A safe parting because it has no trace of free silica. Sold on a money-back guarantee. Try a sample barrel.

● Every one of the four products above spells "luck" for hundreds of foundries. Each one is designed to help you get more and better castings, day after day. Each is tops in its field.

If there is one of this four you are not using, it will pay you to investigate it. Your letter will bring details, samples or a demonstration, as you prefer.

THE FEDERAL FOUNDRY SUPPLY CO.

4600 East 71st Street • Cleveland, Ohio

Seacoal Plant — Mines

CHICAGO CHARLEROI, PA. CHATTANOOGA, TENN. DETROIT MILWAUKEE MINNEAPOLIS NEW YORK ST. LOUIS RICHMOND, VA. UPTON, WYO.

THE FOUNDRY

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NUMBER 10

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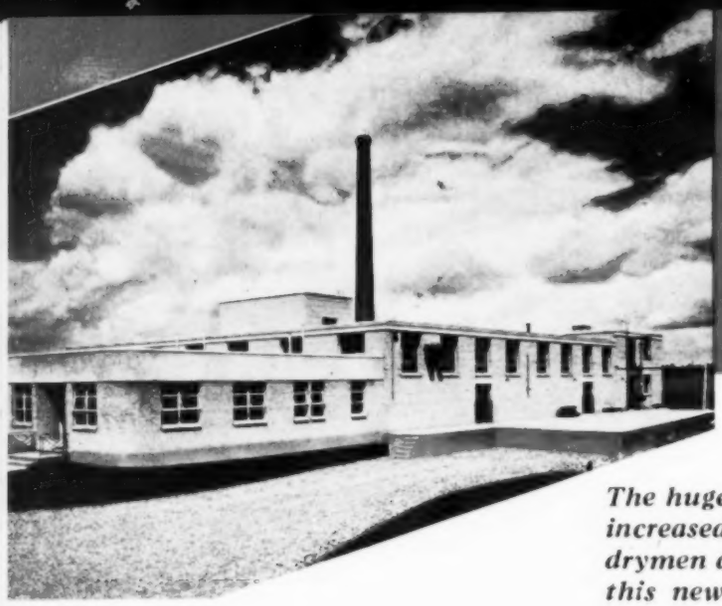


CANADA'S DEMANDS

The huge production of war castings in the Dominion, and the increased appreciation of uniform Linoil by the Canadian foundrymen as an aid to fast work and sure results, made necessary this new Linoil factory in Toronto to replace our old Royce Avenue plant. New address, Werner G. Smith, Ltd., 200 Fairbanks Avenue, Toronto, Ontario.

THE GRINNELL COMPANY of Canada, Ltd , have used Linoil since 1939. Before that? They were confirmed linseed oil users. Like a number of other good foundrymen they knew linseed oil, knew it made good cores, and knew it usually ran pretty uniform. They were satisfied. Stories of "better than linseed oil" left them cold.

But after Linoil *"made in Canada"* became available they said: "Very well, you may send us a drum of Linoil but we will return it if we do not get as good results as we do with linseed oil."

The trial drum did not come back. Instead came orders for more and more Linoil. So well pleased were Grinnells with the results from Linoil that the foundry was soon using Linoil for ¾ of their work.

Then came the increasingly heavy schedules for essential war castings until the foundry is now actually turning out 3½ times its rated capacity tonnage. And Linoil is meeting this test. So smoothly and efficiently does Linoil work that this heavy demand on the core-room is being successfully met without increased equipment. Grinnells like Linoil.

LINOIL

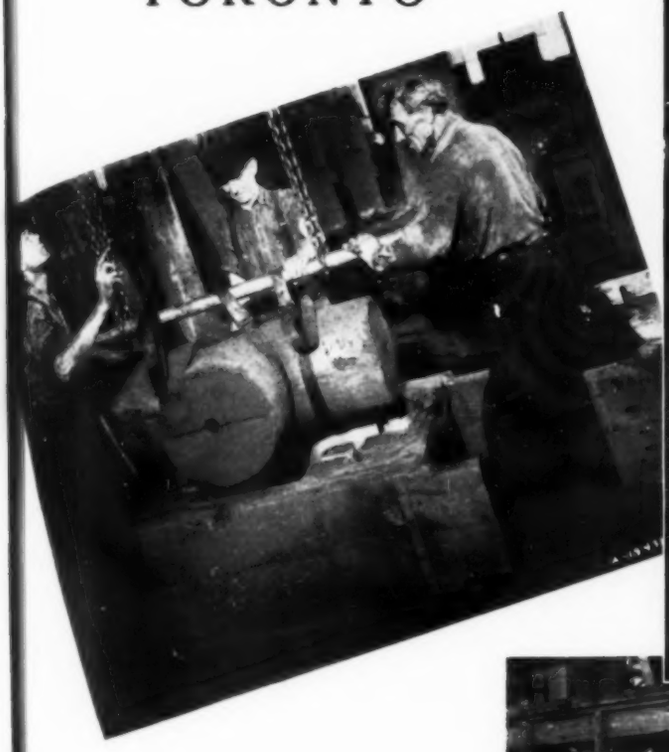
IN PEACE

IN WAR

EXPANDING TONNAGE LINOIL

Scenes in the foundry of

GRINNELL
COMPANY OF CANADA
LTD.
TORONTO



Three busy spots in the Grinnell Foundry. The man by the corerack is the Core Boss. He is Arthur Taylor who without additional core-making equipment but with the aid of Linoil is keeping the foundry fully supplied with cores in its 3½ times normal output. Setting 16 in. T core. Continuous pouring floor.

Look for uniformity in Linoil. Look for smooth fast production of good true cores. Look for improved castings and shorter labor costs.

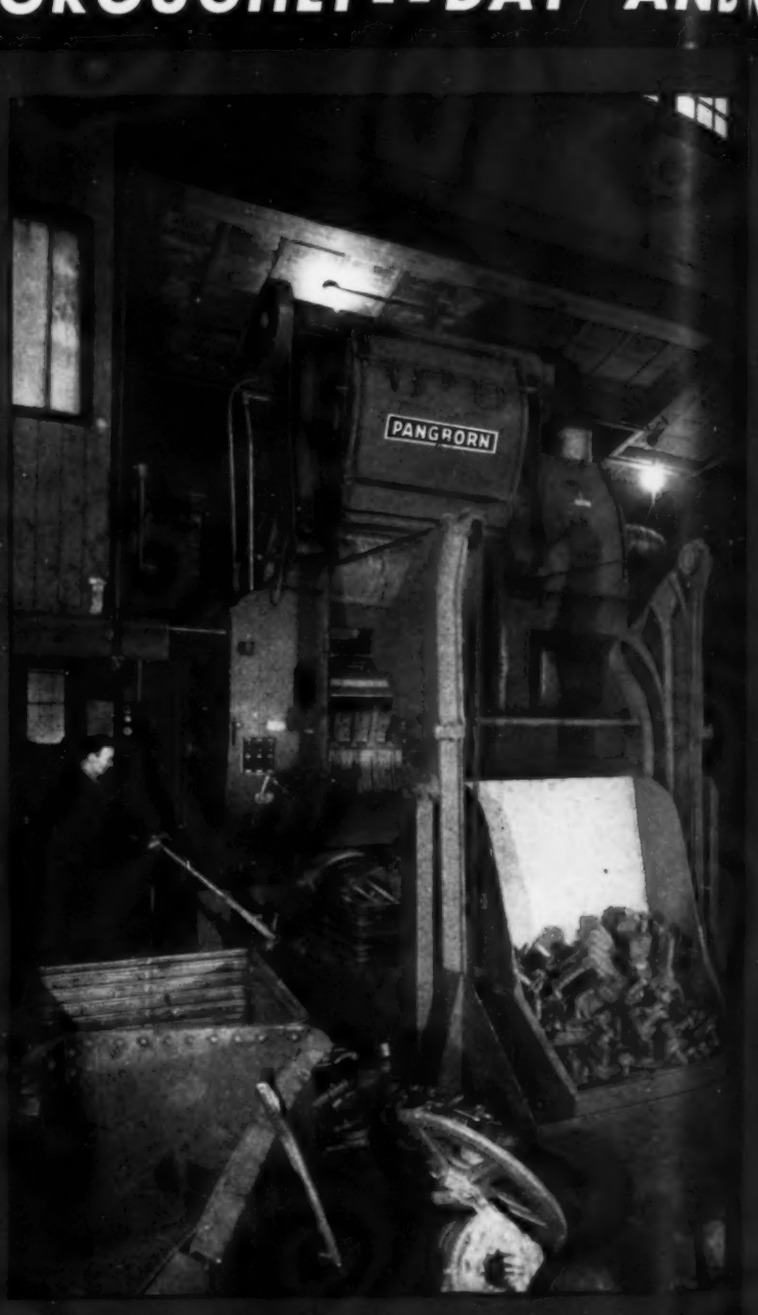
THE WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 West 110th Street — Cleveland, Ohio

"ROLLING ALONG"

UNBROKEN STREAMS OF BOMBS, SHELLS, GUNS, [A
CLEANED--*QUICKLY*--*THOROUGHLY*--DAY AND N



WORLD'S LARGEST MANUFACTURER OF BLAST

PANG

PANGBORN CORPORATION . . . . . .

WITH ROTOBLAST!

S; TANK, PLANE AND SHIP PARTS, ETC.; ARE BLAST
ID NIGHT--WITH PANGBORN EQUIPMENT--

1--swelling Allied arsenals!

2--flowing to battle fronts in Russia, in England, in China, in Australia, in Egypt!

3--bringing the European invasion nearer hour by hour!

Hour by hour—without stop or letup—Blast Cleaning of iron and steel castings, forgings, heat treated and other metal parts is "Rolling Along" the products of war in foundries everywhere. The cry from the sea, from the land, from the sky is "More! More!" and "Faster! Faster!"

Pangborn engineers are solving new blast cleaning problems daily—contributing knowledge and experience toward producing more and better work—helping further soar industry's greatest production record by means of Air and Airless Blast Cleaning.

Pangborn men and management work tirelessly—three shifts daily—making available more shipments of Pangborn equipment than yesterday seemed possible. Yet the calls still come!

Are you the next to be helped? Do you need increased production to "Roll Along" more products to the Yanks and Allies at the fronts? ROTOBLAST or Air Blast Cleaning may be the solution to your problem. Let us show you what we have done for many, many others. Write or wire.

CLEANING AND DUST CONTROL EQUIPMENT

BORN

HAGERSTOWN, MARYLAND

Champions *wear*

AIR RAID WARDENS

DEMOLITION AND CLEARANCE CREWS

AUXILIARY FIREMEN

DECONTAMINATION SQUADS

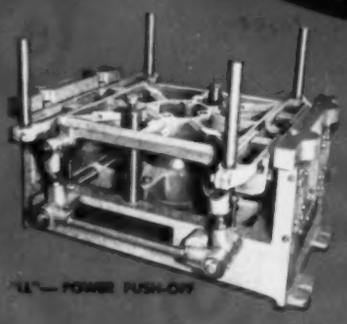
MESSENGERS

RESCUE SQUADS

EMERGENCY FOOD AND HOUSING CORPS

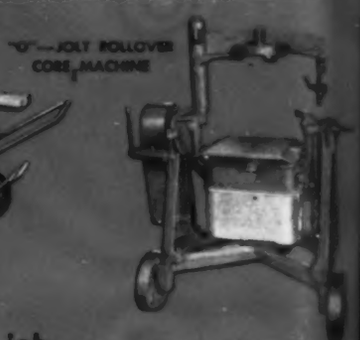
Champion
MOLDING and CORE MACHINES

45 *years*
OF SERVICE TO THE FOUNDRY INDUSTRY



"L"—POWER PUSH-OFF

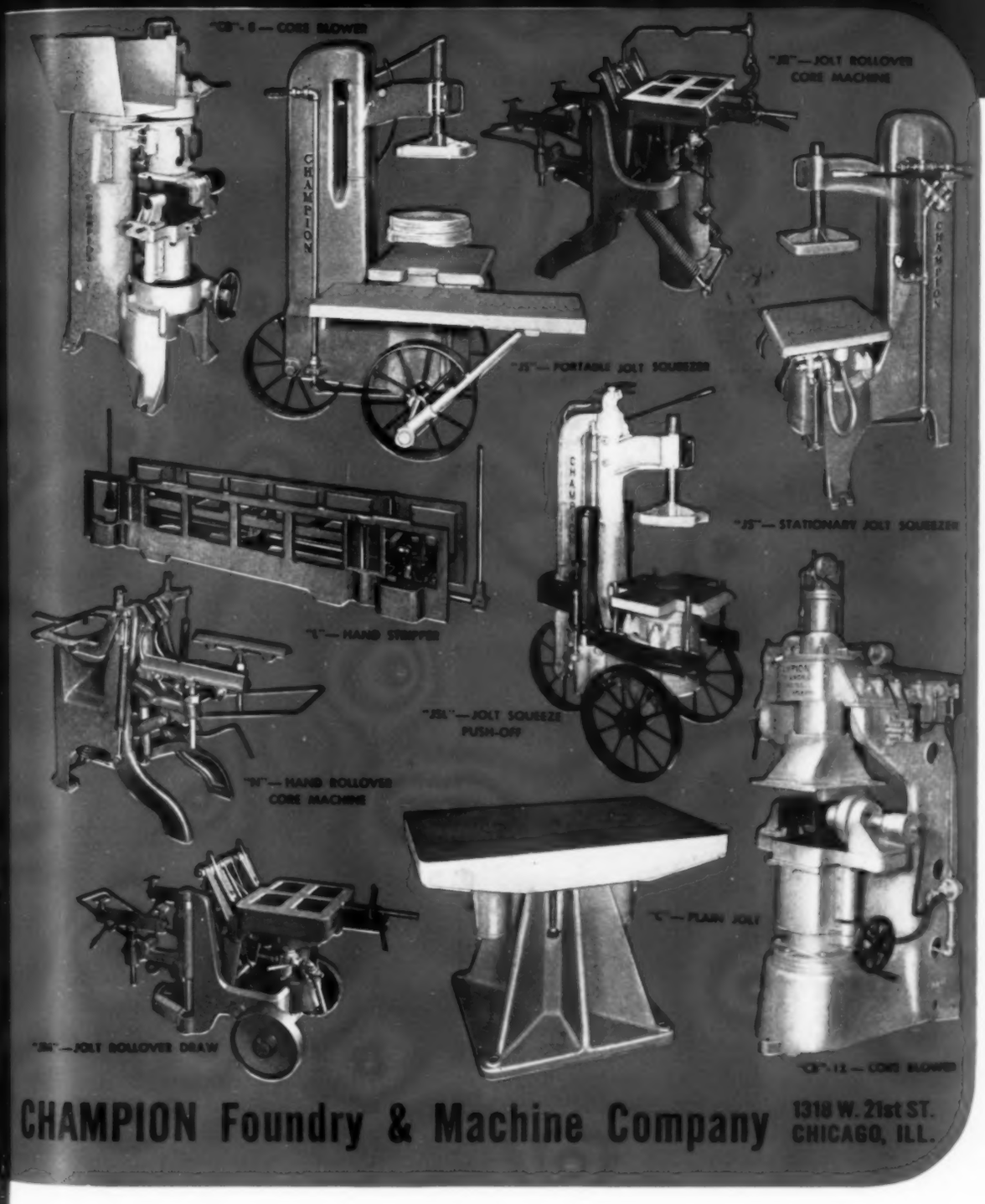
"W"—HAND ROLLOVER



"O"—JOLT ROLLOVER CORE MACHINE

Every Champion installation is guaranteed to do the job you expect, exactly as you plan it.

the Chevrons of Experience


"CB"-5 — CORE BLOWER
"JB" — JOLT ROLLOVER CORE MACHINE
CHAMPION
"JS" — PORTABLE JOLT SQUEEZER
"JS" — STATIONARY JOLT SQUEEZER
"I" — HAND STRIPPER
"JSL" — JOLT SQUEEZE PUSH-OFF
"H" — HAND ROLLOVER CORE MACHINE
"C" — PLAIN JOLT
"JH" — JOLT ROLLOVER DRAW
"CB"-11 — CORE BLOWER
CHAMPION Foundry & Machine Company
1318 W. 21st ST.
CHICAGO, ILL.

FIRE WATCHERS

THE MEDICAL CORPS

NURSES' AIDES CORPS

ROAD REPAIR CREWS

DRIVERS' CORPS

BOMB SQUADS

AUXILIARY POLICE

OUR ALLOYS MAKE

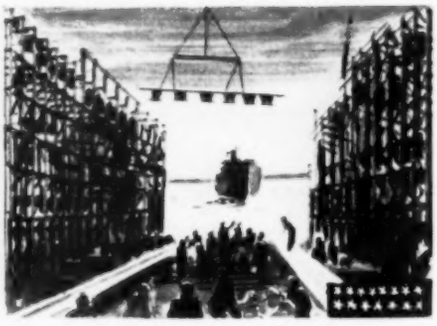
We are among America's principal producers of ferro alloys.

These alloys are required in the making of every pound of steel to fight the Axis.

Some of these alloys are used primarily to take impurities out of steel. For example, 50% Silicon, Titanium, and Alsifer.

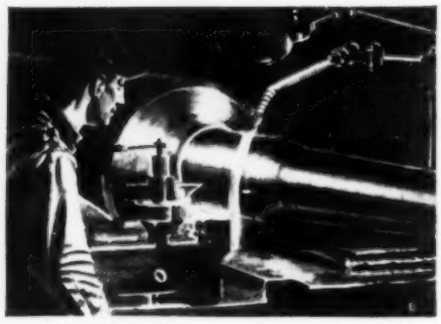
Other alloys are added to steel and iron to increase strength, hardness, resistance to shock, heat, wear, and other special properties. Such alloys are Vanadium, Chromium, 75-95% Silicon and various foundry alloys.

VANADIUM goes into the finest of all steels—to make armor plate, shafts for tanks, ships, airplanes. Vanadium is also indispensable for high speed tool steels that carve out guns, gears, shells. Then, too, vanadium springs, castings, heavy and light forgings are among the best in the world—now 100% at work to beat the Axis.



ALSIFER . . . . . .

(ferro-silicon aluminum alloy) is used to purify (deoxidize) quality steels. Perfect addition to contribute fine grain, control of grain size, and uniform hardness with high aluminum efficiency.



CHROMIUM . . . .

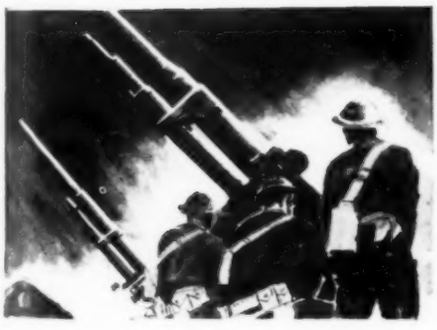
We make all grades of ferro-chromium — .05%-2.00% carbon grades for stainless and carburizing steels; 4%-6% carbon grades for medium and high carbon steels; foundry grade for cast iron.

GRAINAL . . . . . .

(titanium-aluminum-zirconium) ladle or ingot addition to increase hardenability in fine-grained steels. Usually increases hardenability, toughness and resistance to impact simultaneously.

TOUGH ON THE AXIS

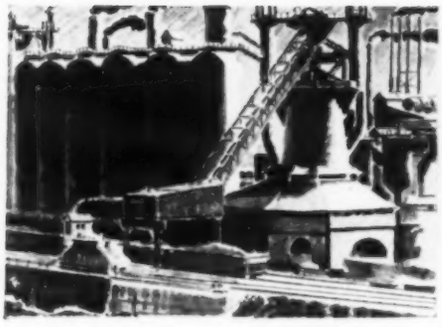
STEEL TOUGH...



IRON FOUNDRY ALLOYS.....

V-5 and V-7 Alloys reduce depth of chill and variation in chill depth, improve machinability.

Graphidox—a powerful graphitizing agent.



SILICON .....

We make all grades of ferro-silicon from 25% to 95%. 25% and 50% are primarily used to deoxidize steel; 75%-95% grades for electrical properties, corrosion resistance and for springs.

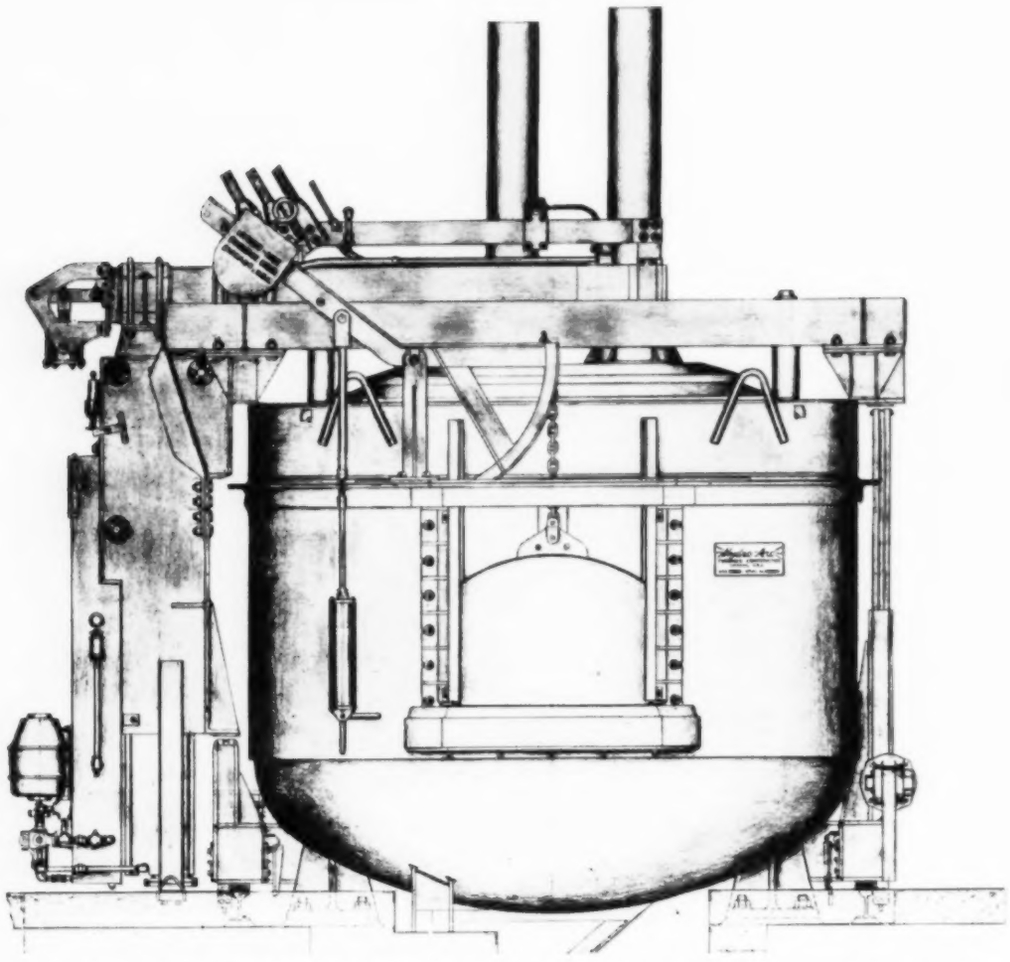
TITANIUM.....

We make all grades of titanium; high and medium carbon grades for deoxidizing and cleansing steels; low carbon grades for stabilizing carbides in high-chromium stainless steels.

VANADIUM

CORPORATION OF AMERICA · NEW YORK, N. Y. FERRO-ALLOYS

★HYDRO-ARC ELECTRIC FURNACES are Speeding Steel Foundry Production



Steel for Victory! This detailed sketch of a Hydro-Arc Electric Furnace under construction will give you some idea of the improvements in design and conception which characterize our equipment. Censorship precludes showing photographs of actual installations.

These salient facts about the Hydro-Arc Electric Furnace may be of interest to you. It uses low inertia air for counterbalancing to cooperate with a simple, accurate hydraulic control to operate each electrode. The few moving parts of this combination have no stretchable steel cable nor limit switches to watch. Low upkeep—less surging—less electrode wash and more accurate metal making at lowest costs are results being achieved. Also water cooled arms and copper and plate insulation back from heat *and power operated electrode clamps.*

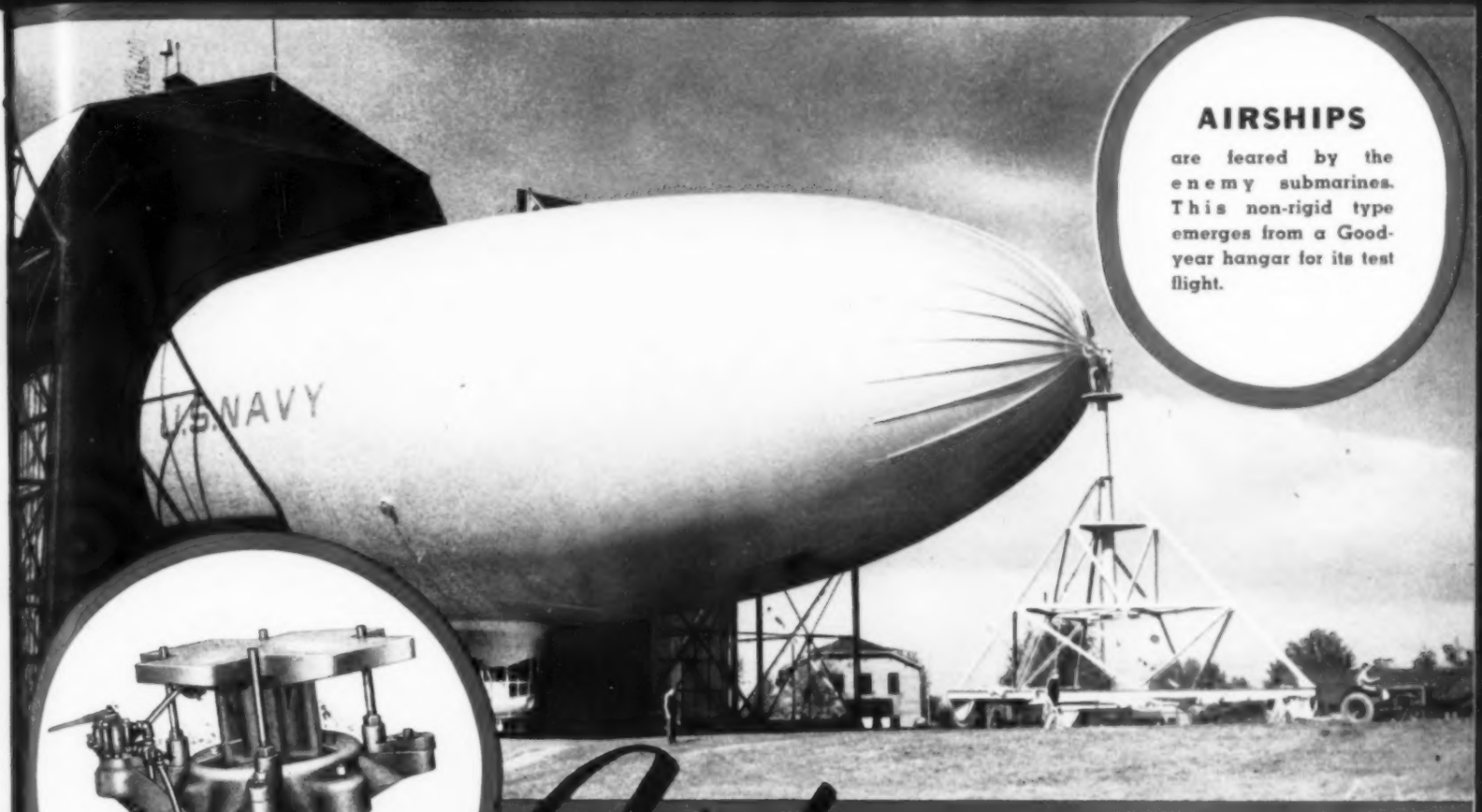
★SUB-STATION REVISION of present furnaces.

Defense speed-up may mean overloads on present transformer equipment, resulting in burnouts and costly shutdowns. You may enlarge your transformer to do your faster operation without overheating. Your inquiries are invited.

HYDRO-ARC FURNACE CORPORATION

Associated with WHITING CORPORATION

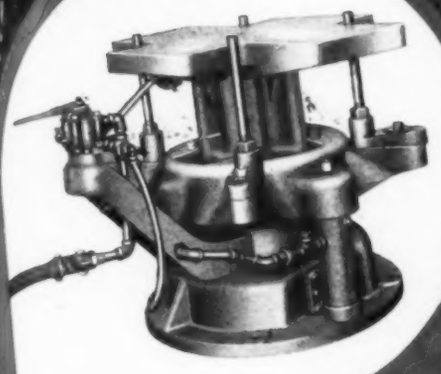
9 SOUTH CLINTON ST. CHICAGO, ILL., U.S.A.



AIRSHIPS

are feared by the enemy submarines. This non-rigid type emerges from a Goodyear hangar for its test flight.

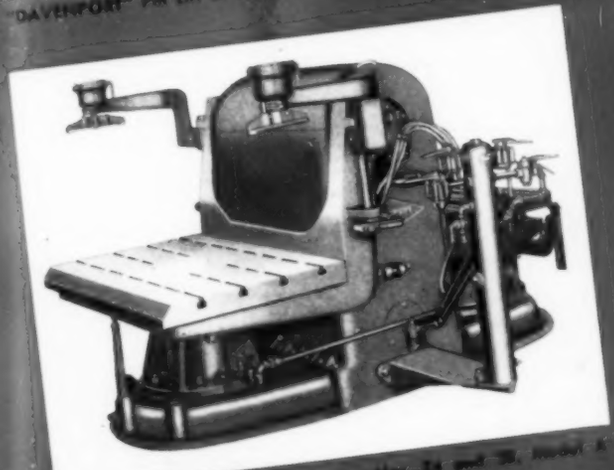
GOODYEAR PHOTO APPROVED BY U. S. NAVY



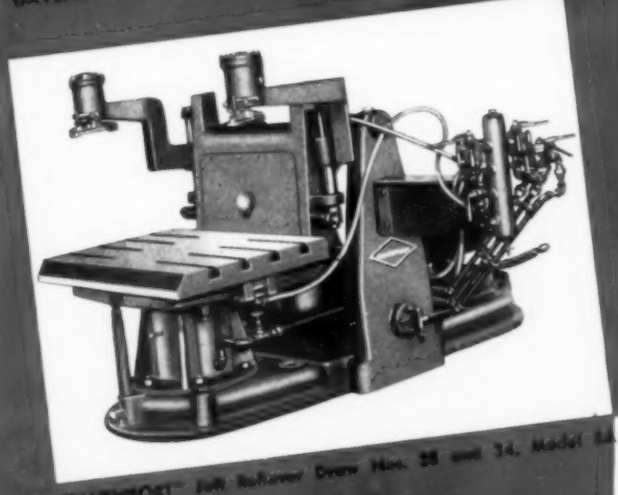
"DAVENPORT" Pin Lift or Push-off Nos. 24 and 28, Model AJS

Where WEIGHT IS IMPORTANT

Magnesium Castings



"DAVENPORT" Jolt Rollover Draw Nos. 24 and 28, Model A



"DAVENPORT" Jolt Rollover Draw Nos. 28 and 34, Model SA

Both in the army and the navy, where weight is important, more and more magnesium castings are being specified.

"Davenport" Foundry Molding machines are proving their worth in increasing the production of magnesium castings in many of the leading foundries of America, where this light efficient metal is handled to assist in building better war machines.

If you are contemplating converting your present foundry to the production of magnesium castings or increasing your present facilities, it will pay you to investigate why Davenport Molding Machines are enjoying this outstanding preference.

"Davenport" Molding Machines can be adapted without special or expensive pattern equipment, both for molding or core work.

"DAVENPORT" LINE OF MOLDING MACHINES

JOLT ROLLOVER DRAW MACHINE
Model SA (Seven sizes)
Capacity from 750 to 12,000 lbs.
Model A (Six sizes)
Capacity from 1,000 to 12,000 lbs.

JOLT STRIPPER OR PUSH-OFF MACHINES WITH ADJUSTABLE LIFT PINS
Six sizes—Capacity from 1,000 to 10,000 lbs.

PLAIN JOLT MACHINES
Fourteen sizes—Capacity from 200 to 25,000 lbs.

Write today for our new catalog.

DAVENPORT MACHINE & FOUNDRY CO.
DAVENPORT **IOWA, U. S. A.**

"Get in the Scrap"

with DINGS MAGNETIC SEPARATORS

• Dings High Intensity Magnetic Separators can help you speed up reclamation and conservation, help you to get more and more vitally needed metal to fill the hungry maw of all-out war production.

Reclaiming iron from the waste pile, from foundry sand, from slag . . . separating ferrous and non-ferrous scrap . . . taking iron out of reclaimed non-metallics . . . concentrating ore . . . handling scrap and other metal—these are a few of the jobs Dings Magnetic Equipment can do to help.

Write to Magnetic Separation Headquarters today—and ask for a copy of The Magnetic Alchemy Bulletin.

DINGS MAGNETIC SEPARATOR CO.
512 E. Smith Street • Milwaukee, Wisconsin

World's Largest Exclusive Builder of Magnetic Equipment—Established 1899

Follow the ERIE PLAN!

THE ERIE PLAN of Industrial Conservation set up by the leading manufacturing interests of Erie, Pa., has received full endorsement of the Bureau of Industrial Conservation of the War Production Board and is rapidly becoming a model plan for other industrial centers. Designed to salvage and reclaim every possible pound of critical materials including iron and steel, non-ferrous metals, rubber, woolen, cotton, wood, burlap and miscellaneous materials, the Erie Plan has sent salvage managers into every nook and cranny of their plants to ferret out waste materials that can be used to help win the war.

You, too, can Get in The Scrap with a salvage system that will pay you and your country well. Do it now—time means everything.

Dings MAGNETIC SEPARATION HIGH INTENSITY

MACKLIN GRINDING WHEELS

When production troubles demand solution, it's only wisdom to call for a specialist . . . If you have unsolved grinding wheel problems, ask for the services of a Macklin Field Engineer . . . Macklin Grinding Wheels are made in all sizes and shapes and grain and grade combinations to fit every type of grinding job. Macklin Field Engineers will gladly help you in selecting the most efficient wheel for best grinding results.

DON'T TAKE BONDAGE — INVEST IN BONDS

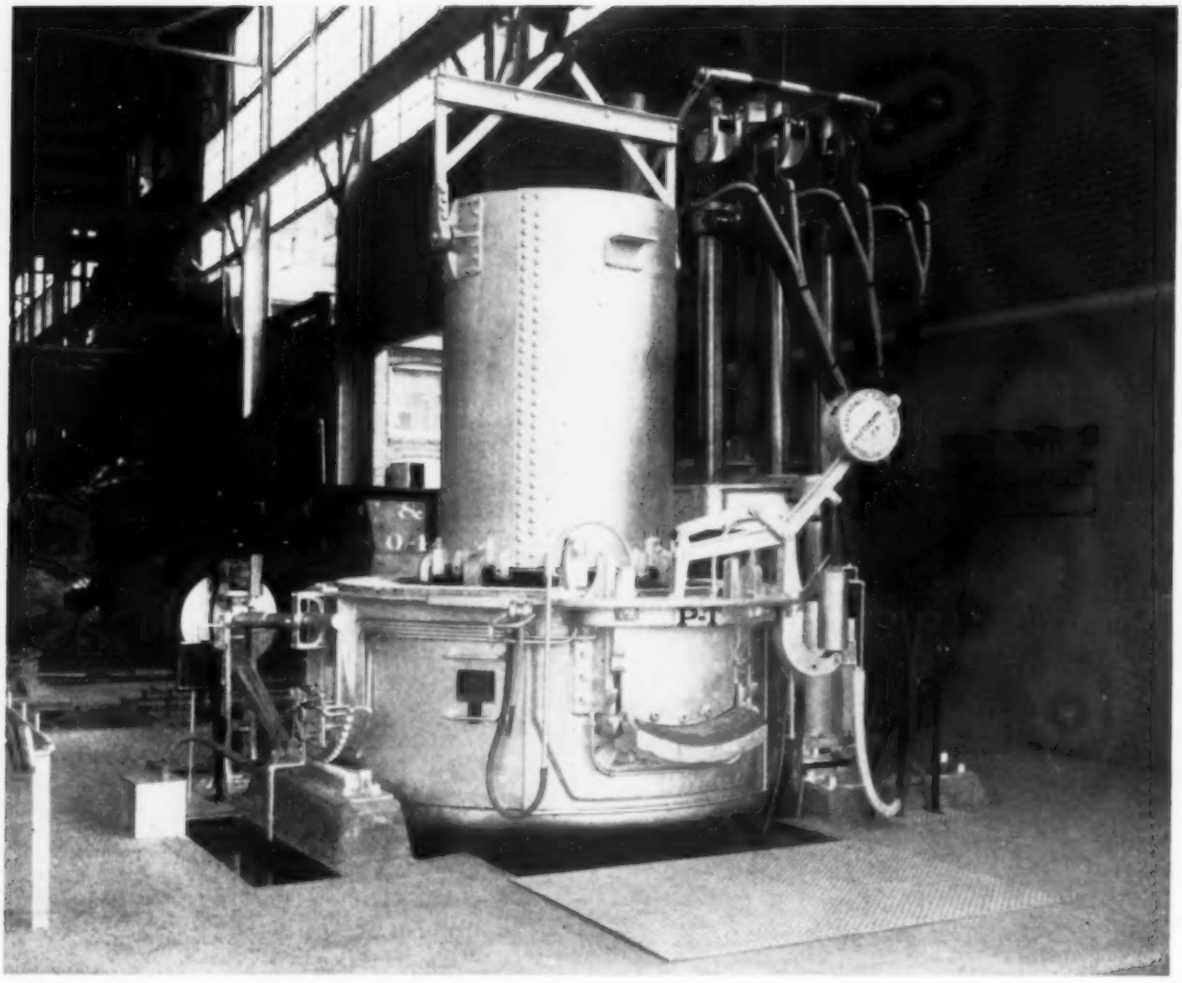
MACKLIN COMPANY

Manufacturer of Grinding Wheels

JACKSON, MICHIGAN, U.S.A.

SALES OFFICES

CHICAGO - NEW YORK - DETROIT
PITTSBURGH - CLEVELAND
CINCINNATI - MILWAUKEE - PHILADELPHIA



This illustration shows a size "PT" 3-ton quick top charge type LECTROMELT, with patented lift and swing-aside-roof. The crane positioned drop bottom bucket is in place to unload on furnace hearth.

For Economy and Speed in *Steel Production*

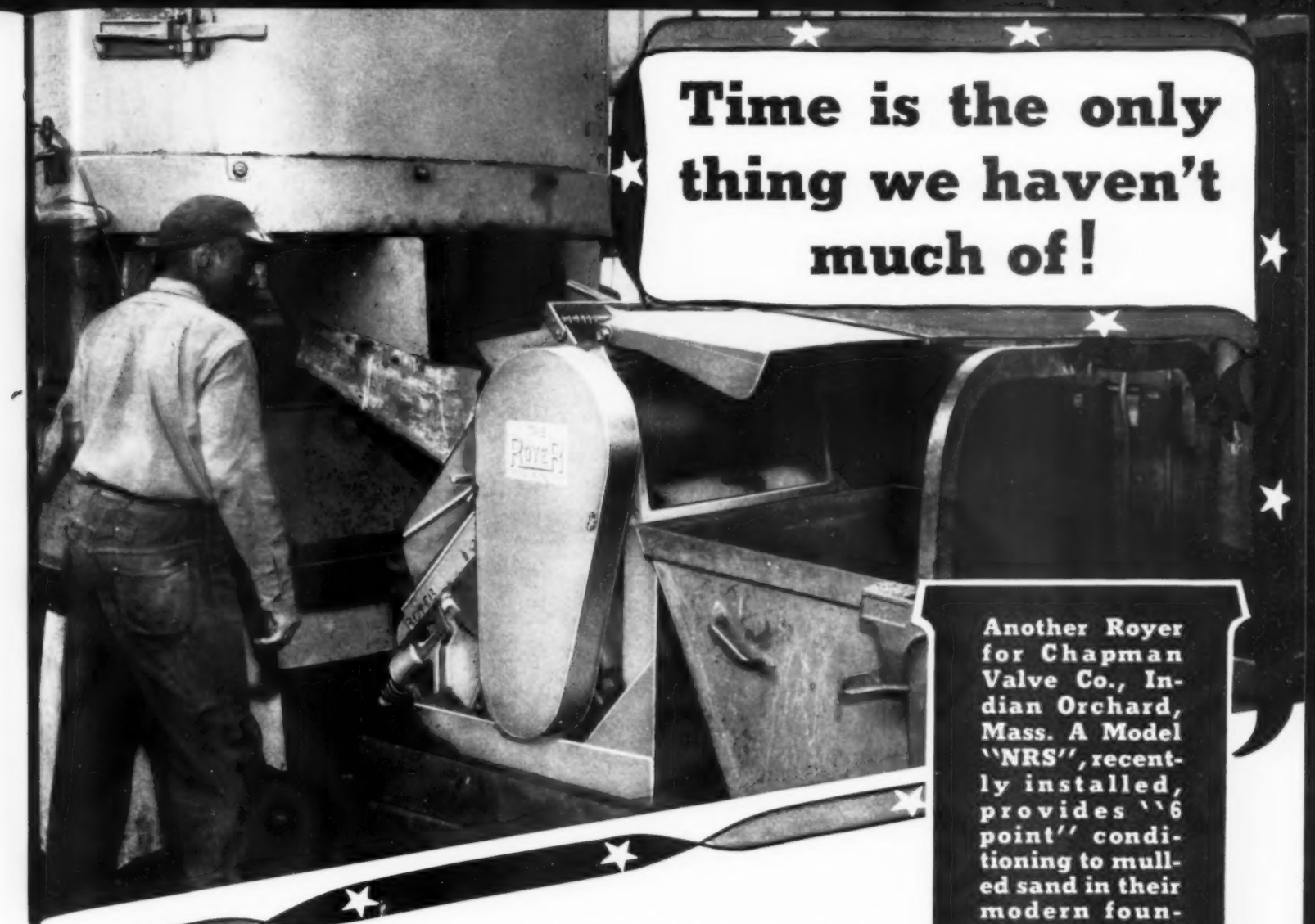
★ Top charge type LECTROMELT Furnaces, in increasing numbers, are contributing in a vital way to the insistent demand for more steel production. Their advantages include greater production with less consumption of power; lower electrode and refractory costs; and increased tonnage per man hour.

LECTROMELT furnaces are ruggedly built to give long service with low maintenance and with rapidity and economy of operation. They are available in standard capacities ranging from 100 tons down to 25 pounds. Complete details on request.

Moore Rapid
Lectromelt
Furnaces

PITTSBURGH LECTROMELT FURNACE CORPORATION

Pittsburgh, Pennsylvania



Time is the only thing we haven't much of!

Another Royer for Chapman Valve Co., Indian Orchard, Mass. A Model "NRS", recently installed, provides "6 point" conditioning to mulled sand in their modern foundry. They purchased a Model "NRS" in 1940 and a portable Model "NB-4" in 1941 — three in all. Repeat orders reflect satisfaction!

War production requires a lot of castings as fast as they can be made. Every one counts. Scrap losses hinder our war production and directly affect your pocketbook. Properly conditioned sand is the best protection against faulty molds. You can be sure of your sand if it has had "6 point" preparation in a Royer Sand Separator and Blender. No other mechanical device can duplicate the exclusive "combing belt" action of this machine. Its cascading, raking, riddling action gives you:

- ★ Refuse removal—gaggers, burned cores, tramp iron can't get by the sweep.
- ★ Lump breaking—hundreds of steel fingers go to work on lumps and clay balls.
- ★ Thorough tempering and mixing—Royers are not clogged by moist sand.
- ★ Moisture evenly distributed through the heap.
- ★ Increased permeability—gas escapes better.
- ★ Double aeration—once on the belt and once as it is being discharged.

We have the materials and manpower, but *time for making good castings is short*—don't waste it on discount. The Royer rapidly conditions facing, backing and core sand—once through. Over 500 Royers in use. Eight stationary and portable models for ferrous and nonferrous jobbing shops, 5 to 50 tons. Stationary units for inclusion in the sand conditioning circuit of production foundries. Combination scrap remover—sand separator and blender units with hopper, lifted by crane from floor to floor, for medium and large steel jobbing foundries.

Let the Royer representative give you "production counsel."

Royer Foundry & Machine Co.

159 Pringle St., Kingston, Pa.

THE ROYER

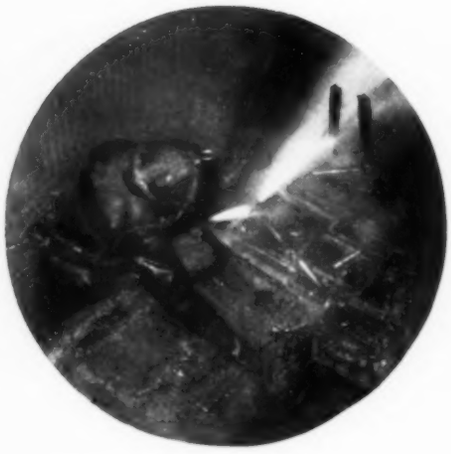
ROYER FOUNDRY & MACHINE CO. KINGSTON, PA.

AMERICA'S FOUNDRIES

ARE "CARRYING COAL TO NEWCASTLE"

UNLESS THEY ARE HYDRO-BLAST

EQUIPPED!



Hydro-Blast delivers sand and water against the casting at 1,200 pounds pressure, and 3 miles per minute velocity. Hydro-Blast quickly returns your investment through washing, drying and recovering for re-use sand that is now wasted.

The many million tons of foundry sand recovered annually by Hydro-Blast for re-use save many millions of freight ton miles which are so vital to Victory. It is easy for you to figure the cost of your silica sand from point of origin to your dump. When you recover more than 80% of your presently wasted sand, you reduce your production costs immeasurably and provide your Country with much-needed transportation facilities. Let us show you how Hydro-Blast operates.

HYDRO-BLAST Corporation

2550 N. WESTERN AVE., CHICAGO

MEXALOY

for increased lining life of

CUPOLAS

SPOUTS

LADLES

● Unforgettable as "A B C" and equally simple in composition—are the ingredients essential to prolong the lining life of your ladles, spouts, runners and cupolas. Protecting these tools of the foundry from the cutting and dissolving action of molten metal will greatly reduce their maintenance cost and result in a minimum of refractory slag inclusions in the casting.

What is Mexaloy? Mexaloy is an especially prepared Graphite product, the base of which is high-grade Mexican Graphite—the purest of all natural Graphites. When combined with ordinary refractory materials Mexaloy imparts to these the super-refractory properties of Mexican Graphite—producing a refractory surface that is easily freed from troublesome skulls, residual metal and slag. . . . By providing uniform expansion and contraction, Mexaloy increases resistance to spalling and cracking and enables the refractory body to quickly adjust itself to shocking temperature changes.

A concise booklet on Mexaloy's simple preparation and application will be mailed you upon request.

MEXICAN GRAPHITE PRODUCTS

CORDIP
MEXITE BRIQUETTES
No. 8 MEXICAN GRAPHITE
MEXALOY
MEXICAN PLUMBAGO

THE UNITED STATES GRAPHITE CO.
SAGINAW, MICHIGAN, U.S.A.

TRADE MARK USG

SLY DUST CONTROL Is Helping Foundries Get Top Production

★Good working conditions for employees is one of the most important considerations today in meeting the demands for production and more production.

SLY DUST CONTROL is inexpensive insurance against health hazards — against lost time. It enables men to work to better advantage — to accomplish more. Sly Cloth Filters positively collect all the dust — even the very finest — from blast rooms, blast mills, tumbling mills, grinders and other dust centers.

Users find in Sly Dust Filters certain exclusive advantages:

(1) Greater filtering capacity because of more filtering cloth

(2) Taut bags (patented) save power and improve dust removal

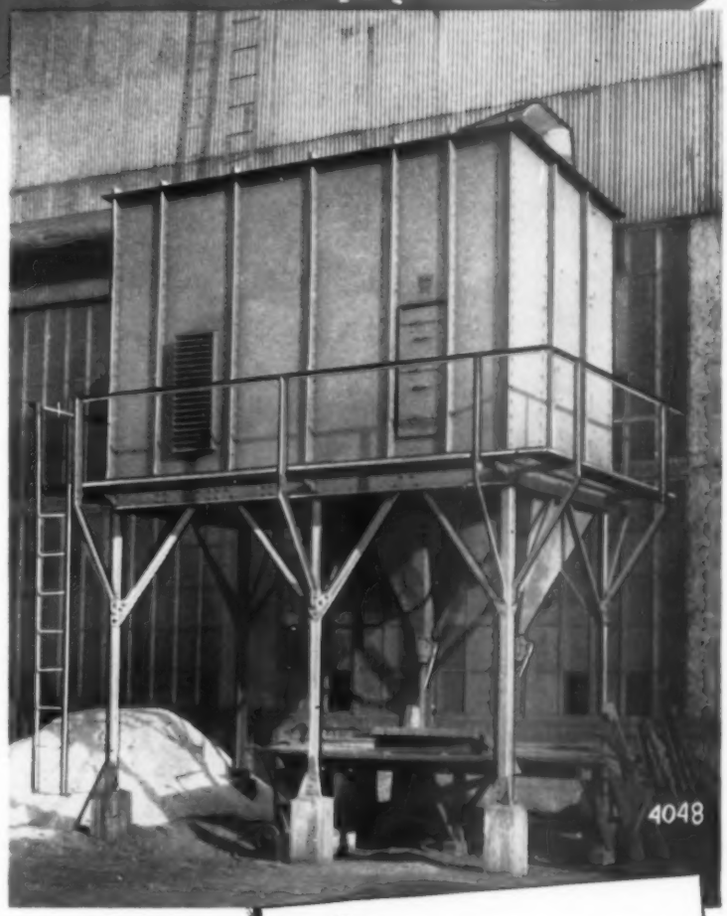
(3) Bags more easily replaced

(4) Automatic control (any degree) minimizes or entirely removes the human factor

(5) Simpler shaker mechanism results in savings in maintenance and operation

These features help enormously in efficient operation.

Write us fully. We will analyze your situation and tell you exactly what can be accomplished. Sly Dust Control pays for itself.

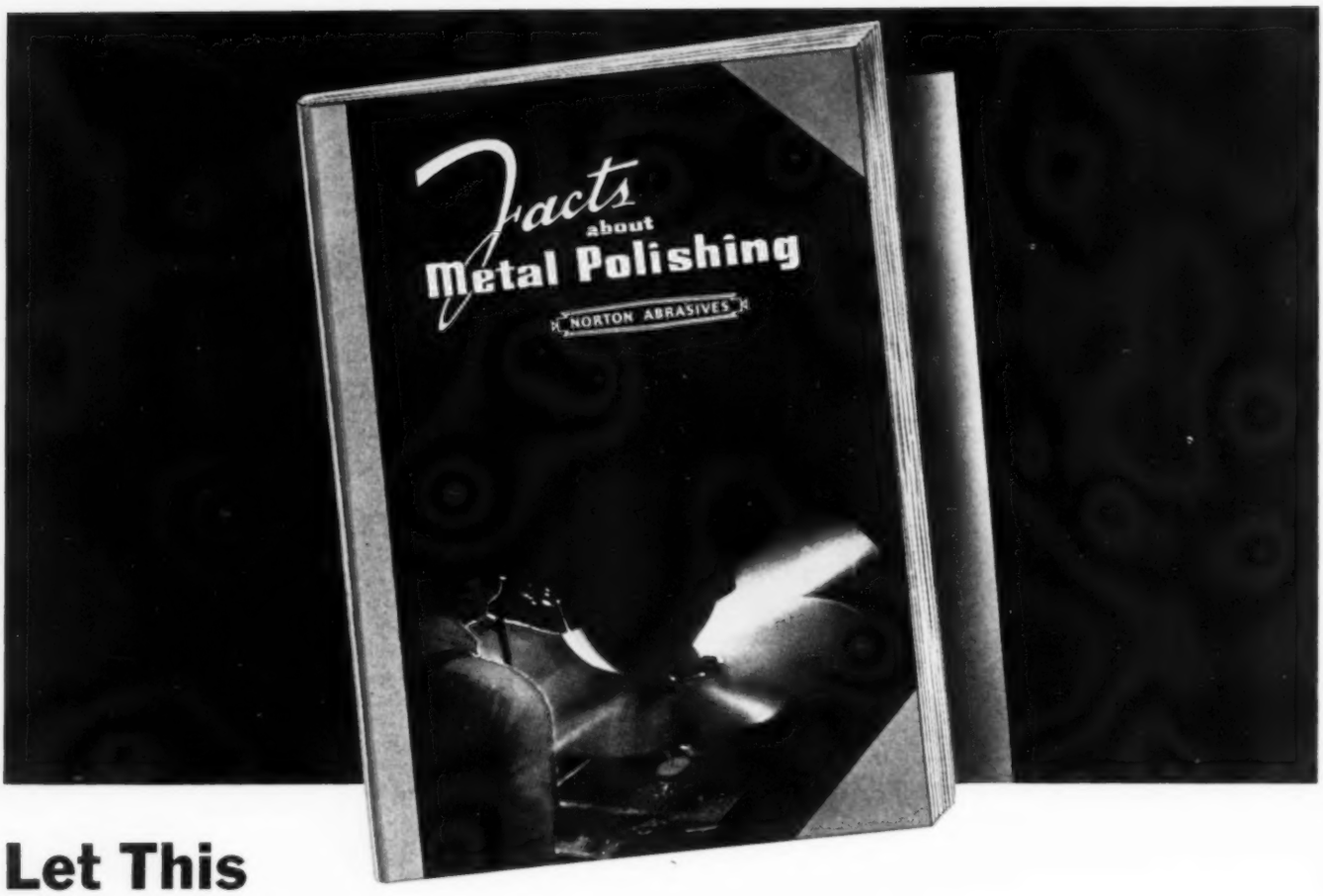


SLY DUST CONTROL INSTALLATION FOR A PROMINENT FOUNDRY

THE W. W. SLY MANUFACTURING CO.

Branch Offices in Principal Cities **4753 Train Ave., Cleveland, O.**

TUMBLING MILLS **SLY** **INDUSTRIAL DUST CONTROL** **BLAST ROOM EQUIPMENT**



Let This Booklet Help You—

Get More Service from Your Polishing Abrasive

IT'S just what the name implies—"Facts about Metal Polishing," 39 pages of useful information. Typical chapter subjects are: Preparation of Glue, Types of Polishing Wheels, Setting Up Polishing Wheels, Setting Up Abrasive Belts, Correct Drying, Factors of Efficient Polishing.

Today, when it's absolutely necessary to get maximum service from your abrasive, this booklet is doubly valuable. Write for a copy now—no charge nor obligation. Just ask for Form 1340F.

NORTON COMPANY, WORCESTER, MASS.

Distributors in All Principal Cities

G-140

NORTON ABRASIVES

SPEED PRODUCTION

WITH

MODERN BUEHLER TESTING EQUIPMENT

VISIT BOOTH E-111 AT THE NATIONAL METAL CONGRESS IN CLEVELAND OCTOBER 12-16 TO SEE THREE OF THE CHANGES WE'VE MADE TO CONSERVE MATERIAL AND IMPROVE OUR PRODUCTS

POLISHERS

The covers which formerly were aluminum are now made of enameled pressed steel. They have been increased in diameter so that they now cover the splash ring as well as the polishing disc. The splash rings which were also made of aluminum are now plastic moldings and prevent the covers from damaging the polisher bowls which we now make of porcelain enameled cast iron.

SPECIMEN MOUNT PRESSES

The specimen mount presses have been redesigned to provide the utmost in ease and speed of making transoptic mounts. The new design retains the solid heater which give the shortest heating cycle, but the new split cooling blocks permit cooling the sample without releasing the pressure. The molding tools are still of heavy construction and have lapped fitting surfaces.

MODERN BUEHLER LABORATORY EQUIPMENT INCLUDES CUTTERS • SURFACERS • GRINDERS • HAND GRINDERS • POLISHING APPARATUS • LEAD LAPS • CAST IRON • TRUE PLATES • ABRASIVES AND CLOTHS • MOUNTING PRESSES • STORAGE CABINETS • STOOLS AND CHAIRS • METALLOGRAPHS • TABLE MICROSCOPES • POLARIZING MICROSCOPES • MEASURING AND INSPECTION MICROSCOPES • BRINELL MICROSCOPES • MICROHARDNESS TESTERS • CAMERAS • REFRACTOMETERS • COLORIMETERS • SPECTROGRAPHS • DENSITY COMPARATORS • CARBONMETERS AND TITRATORS

FOR UNMISTAKABLE DETERMINATIONS

Adolph I. Buehler

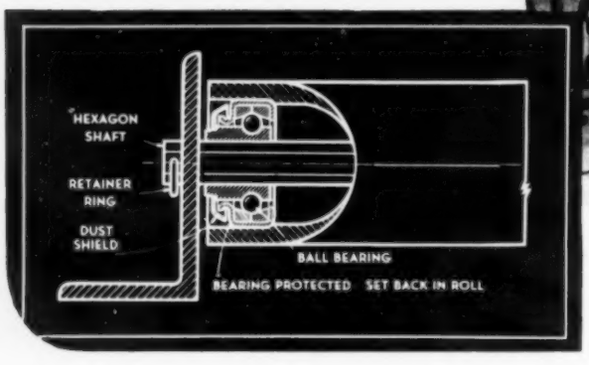
OPTICAL INSTRUMENTS • METALLURGICAL APPARATUS

228 NORTH LA SALLE ST. • • CHICAGO ILL.

SEND FOR COMPLETE DETAILS TODAY

Answering the HELP WANTED Call

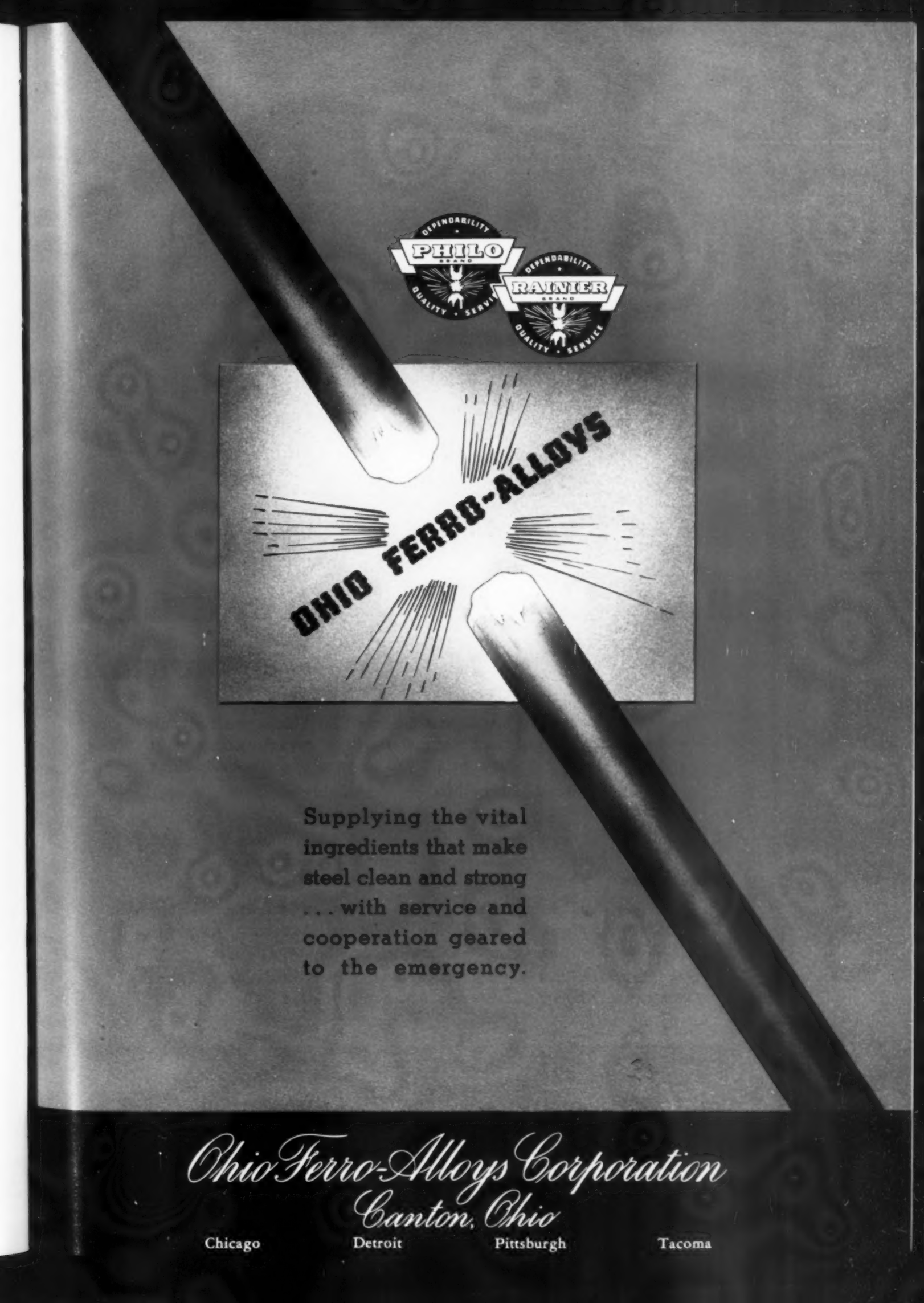
FOUNDRIES WISE, mechanize! With Logan Conveyors to perform all the tiring, tedious, fetch-and-carry jobs, men can devote 100% energy and time to *production*. In this very practical sense the "help-wanted" appeal is answered. Investigate today ***your*** conveyor possibilities. The nearest Logan engineer is at your service. LOGAN CO., Inc., 580 Cabel, Louisville.



★ ABOVE: *Part of a comprehensive Logan Conveyor system in a modern foundry. Illustration shows end of assembly line for heating units. After units have been assembled, virtually "on the move", they are transferred from the line to storage. LEFT: Logan Foundry Rolls combine ruggedness with simplicity.*

Logan Conveyors

PUT *FLOW* INTO PRODUCTION



Supplying the vital ingredients that make steel clean and strong . . . with service and cooperation geared to the emergency.

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh Tacoma

Adams Cherry Slip Flasks—

The Ideal Combination F

When you buy an Adams Cherry Slip Flask, you not only get a combination of the finest materials and expert workmanship, but you also get a custom-built job to your exact specifications.

Close-grained cherry lumber, thoroughly air dried, is used exclusively, and all corners are machine locked.

Pins to suit your preference—wide-V, double-V, round, double round or special types, accurately machined on bearing surfaces.

The sand strip mechanism is convenient and quick-acting, and it will stand up under the jolting and squeezing of power machines.

Our facilities have kept pace with increased demand, and we can give your requirements prompt attention.

THE ADAMS COMPA

MOLDING MACHINES · FLASK

—Adams Cast Iron Jackets

n *From Every Standpoint*

Used in combination with the Adams Cherry Slip Flask or the Adams Cherry Snap Flask, these jackets form a combination that cannot be excelled for convenience and for economical production.

Great strength and rigidity with minimum weight are assured by the combination of horizontal and vertical corrugations. Inner surfaces are accurately surface ground, and assembly is made on a fixture to exact size and to assure correct taper in the case of tapered jackets.

If you prefer steel jackets, we have them also. Regardless of your preference, specify Adams Jackets for proper mold protection.

A NY · DUBUQUE, IOWA · U.S.A.

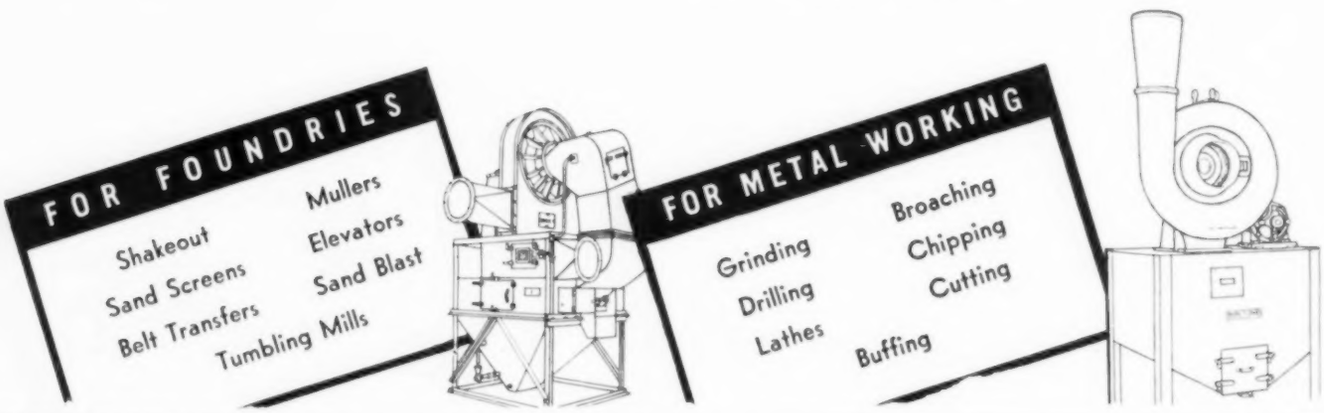
K EQUIPMENT Established 1883

The whole story of the part which Dust Control plays in enabling industry to keep abreast of war production demands can't yet be told.

Only the men behind the scenes and the AAF engineers responsible for designing and installing the equipment know how vital adequate dust control is to maintaining delivery schedules and worker efficiency.

The foundry and metal working industries are typical. Our delivery of Roto-Clone dust control units to these basic war industries has quadrupled since the war began and we are still working around-the-clock to meet their demands.

If you have a dust problem, write for the name of the nearest AAF engineer—he will be glad to discuss your dust control needs without obligation.



AMERICAN AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 266 CENTRAL AVE, LOUISVILLE, KY.
INCORPORATED
IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

WHY THESE FOUNDRIES GET BETTER AL-MG CASTINGS

Lately, I've nosed around in lots of aluminum and magnesium foundries, noting their methods and checking their production of castings.

Do you know what I found? The foundries that are breaking all records for production of fine aluminum-magnesium castings use Despatch furnaces. And cores for these castings are baked in Despatch ovens.

The Despatch units shown here are typical of the equipment now in constant use in scores of aluminum and magnesium foundries. Their massive heaters, big high-velocity fans, and adjustable heat distributing ducts combine to produce efficiently controlled recirculated heat -- the exact heat for fine, precision castings and quality cores.

That's why the aluminum or magnesium castings heat-treated with these furnaces regularly test higher in uniformity, tensile and elongation.

So investigate Despatch furnaces and ovens! Let a Despatch engineer show you how to improve your output of high grade castings. Write or wire today for complete information.

Torrid

P.S.- DON'T FORGET TO VISIT THE DESPATCH BOOTH A-415 AT THE METAL SHOW. I'LL BE WATCHING FOR YOU.

Foundry Ovens (recirculating convection type) for all material handling systems—batch, drawer, vertical and horizontal conveyor.

Heat Treating Furnaces (recirculating convection type). Many standard sizes for prompt delivery. Also all material handling systems engineered and built in record time.

DESPATCH OVEN COMPANY MINNEAPOLIS

Trying to mull and cool sand without a Speedmullor

is like walking 'round the globe; you'll get there—but when?

No other mill can do the same complete job

The *Speedmullor* requires a 1½ minute maximum cycle to remove fines, thoroughly mull, intensively aerate and cool the sand from the highest temperature to 5 degrees above room temperature. And all those highly essential functions are performed simultaneously—during the regular mulling cycle—in a much less floor space area than any other muller or mixer requires. No other single piece of foundry equipment does the same complete mulling, cooling and aerating job.

THE BEARDSLEY

Completely automatic Model 70 *Speedmullor* with air cooling at Caterpillar Tractor Company, Peoria, Illinois.

Ask any user what he thinks of the *Speedmullor*. Many hundreds of these *Speedmullor* enthusiasts had many years of experience with conventional type mills before *Speedmullor* efficiencies and economies were available. They had ample opportunity to compare the claims and counter claims of all manufacturers—to weigh the performance of one mill against another before investing a single dollar in the *Speedmullor*. That is why *Speedmullors* are America's fastest selling sand muller.

& PIPER COMPANY

2341 NORTH KEELER AVENUE • CHICAGO

GET ALL THE FACTS ON PRODUCTION PERFORMANCE

—Study them and then Judge!

RIGHT NOW, in hundreds of foundries all over the nation, the performance of Simpson Intensive Mixers is being *proved* under the exacting conditions of war-time production. They are mulling all types of sand—conditioning the required tonnages properly and economically—using a minimum of power, labor, bonding materials and maintenance.

In the past 24 months, over 1,000 Simpson Mixers have been installed and ordered by all types of foundries to help them make better castings faster at less cost. They chose Simpson Mixers on the basis of production performance facts. Let us send you *all* these facts. Check them and your choice will be Simpson.

Get in the Scrap NOW!

OVER 5,000 Simpson Mixers are in successful operation all over the world!

SIMPSON

INTENSIVE MIXERS

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.

August 1, 1942.

Mr. James Picker, President
Picker X-Ray Corporation
300 Fourth Avenue
New York City, New York

Dear Mr. Picker:

This is to inform you that the Army and Navy are conferring upon your Cleveland, Ohio Plant the Army-Navy Production Award for high achievement in the production of war equipment.

The patriotism which you and your employees have shown by your remarkable production record is helping our country along the road to victory. The Army and Navy are proud of the achievement of the men and women of your Cleveland Plant.

In conferring this award, the Army and Navy will give you a flag to fly above the plant, and will present to every individual within the Cleveland Plant a lapel pin, symbol of leadership on the production front.

May I extend to the Picker X-Ray Corporation my congratulations for accomplishing more than seemed reasonable or possible a year ago.

Sincerely yours,

Robert P. Patterson
Under Secretary of War

PICKER X-RAY CORPORATION
300 FOURTH AVENUE PX NEW YORK, NEW YORK
WAITE MANUFACTURING DIVISION, CLEVELAND, OHIO

HONOR ROLL
DEDICATED TO THE FOLLOWING EMPLOYEES OF
PICKER X-RAY CORPORATION
AND
WAITE MANUFACTURING DIVISION
WHO HAVE ENTERED THE ARMED FORCES OF OUR COUNTRY
RAY M. KAPP, JR.
VERNE MC DOUGAL
JOHN S. KOUAN
HAROLD T. MORRIS
VODRA T. WOLFE
HARVEY PICKER
BENJAMIN S. ROPER
JULIUS E. ZIMMERMAN, JR.
ANTHONEY J. BIROS
FREDERICK C. BARRETT
LESLIE J. MC LUNER
ROBERT O. TURNER
ROBERT S. BOYNTON
DANIEL J. HOGAN
ROBERT M. ARNOLD
ALVIN G. SPATZ
J. STEWART BARNEY
GEORGE E. DRYFOOS
SAMUEL M. GROVEMAN
WALTER J. SHUDY
GEORGE F. MIHELIC
WALTER J. BREST
JOHN J. FORD
CHARLES DELISI
HENRY J. MAPES
DONALD W. PLISKE
WILLIAM R. BUTLER
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EDWARD S. DRAGONY
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CLARENCE G. ROSITSCH
LESTER DICKERSON
THOMAS BLUE
EDSON C. LEE
THOMAS A. LUDWIG
JOSEPH F. CROSSEN
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JACK GEIGER, JR.
BERNARD ROGOFF
ARDEN J. HAYS
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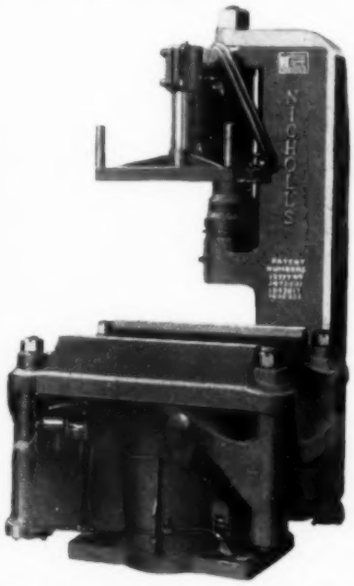
ERNEST TIRABASSI
SAMUEL M. SILVERSTONE
WALTER CIOBAN
DON A. TALLY
RICHARD ANDRUK
THOMAS H. OLSEN
WILLIAM E. BUCKINGHAM
JOHN BARR
PHILIP A. SIEGEL
THE ABOVE NAMES ARE LISTED IN THE ORDER OF ENTRY INTO OUR ARMED FORCES

MOLDING MACHINES

...designed for quality---

TYPE 16-D-OE—Heavy Duty Combination Jolt, Squeeze & Pattern Draw



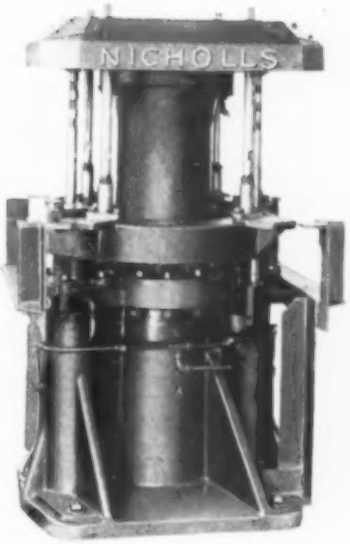
TYPE 12-D—Heavy Duty—Post Type Combination Jolt Squeeze & Pattern Draw—Equipped with Special Frame

FOR YEARS — NICHOLLS Heavy Duty Production Machines have given a tremendous amount of service to their users.

TODAY—More than ever—foundrymen must rely upon their molding equipment to meet war production schedules. They cannot afford to have a breakdown! These machines have played an important role in the success of many large foundries all over the world. This international acceptance is due to their ability to "stand up" under the heaviest production.

Our Type D Molding Machines are built in nine sizes.

We invite you to write for particulars on the NICHOLLS 1942 model production line of Molding Machines.



TYPE 8-JS—Jolt Stripper—Adjustable Pin Lift

TYPE 16-36-DC—Heavy Duty—Jolt Squeeze & Pattern Draw—Equipped with Special Top Frame

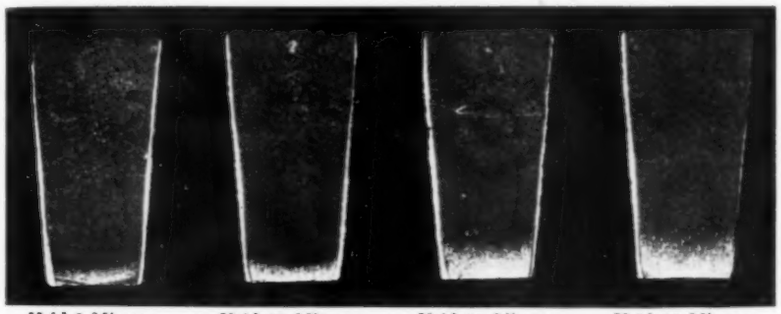
Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK
Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS

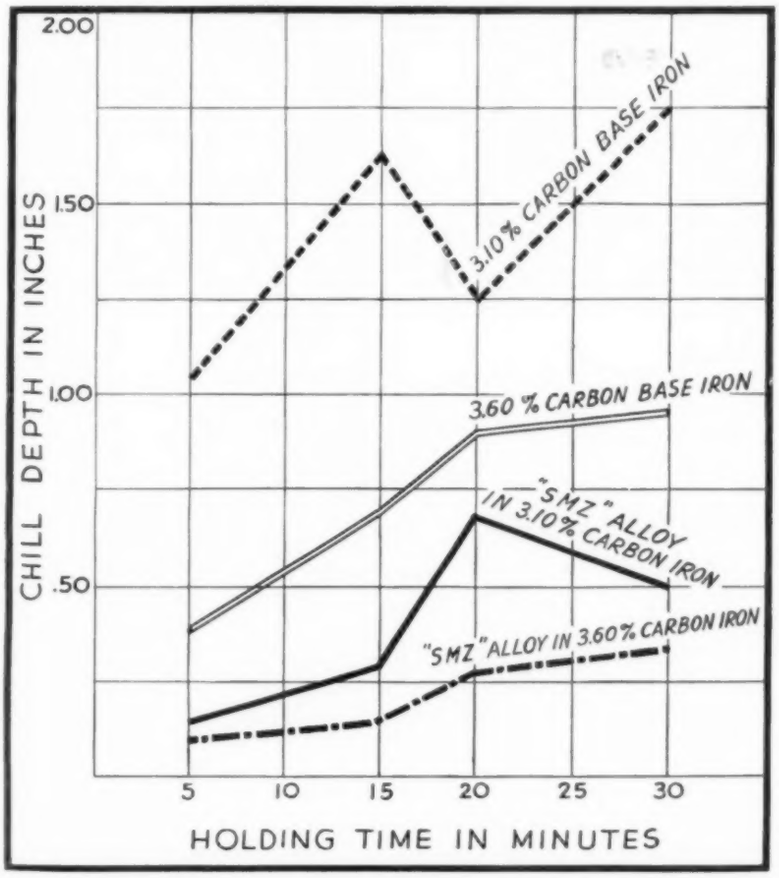
REACH FOR A NEW HIGH IN
YOUR GRINDING PRODUCTION!
Armament production men working on "impossible" completion schedules appreciate more than ever the value of BAY STATE's consistently superior abrasive products. Such "engineered-in" features as Fractional Grades, Controlled Porosity, and H-9 Vitrified Bond have eased to a tremendous degree their great task of obtaining maximum output in minimum time, with ever-increasing grinding efficiency.
As a result of recent plant expansion and new tunnel kiln, deliveries are now better than ever. Use BAY STATE products for greater production!
Send for practical reference book containing a wealth of information on all types of grinding, including Foundry Wheels, Cut-Off Wheels, Mounted Points, Internal Wheel Recommendations, etc. Widely used for training apprentices, new operators and students. Yours on request.
BAY STATE
WHEELS of PROGRESS
BAY STATE
BAY STATE
BAY STATE
THICK
BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

"SMZ" ALLOY *Retains Graphitizing Power When Iron Is Held in the Ladle*



Held 5 Minutes Held 15 Minutes Held 20 Minutes Held 30 Minutes

Chill Blocks of 3.60% carbon iron treated with "SMZ" alloy.



Effect of holding time on chill depth in 3.10% carbon and 3.60% carbon irons untreated, and irons treated with "SMZ" alloy.

ADDITIONS of small amounts of "SMZ" alloy to cast iron in the ladle improve the strength, ductility, and shock-absorbing properties of the iron. Recent tests on 3.10% carbon and 3.60% carbon irons—chill blocks and graphs are shown at the left—indicate that iron treated with "SMZ" alloy and held in the ladle as long as thirty minutes is still satisfactorily graphitized.

Because "SMZ" alloy is a balanced alloy containing silicon, manganese, and zirconium, it produces iron of uniform structure and improved physical properties. By reducing the depth of chill, machinable iron is obtained even at the edges and corners and in thin sections. By using ladle additions of "SMZ" Alloy, foundries can readily make a high-strength cast iron from low-carbon, low-silicon iron.

Our metallurgists will be glad to discuss with you the advantages of "SMZ" alloy and how it can improve your iron. They can also tell you about the many other "Electromet" ferro-alloys and give you practical help in using them to obtain better iron. There is no charge for this service.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York, N. Y.

"Electromet" and "SMZ" are registered trade-marks of Electro Metallurgical Company.

Distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
Trade-Mark
Ferro-Alloys & Metals

"THAT SAND CONVEYOR IS A *JINX!*" He told Me*

*THE REX MAN

. . . "IT'S ALWAYS NEEDING SOMETHING!"

① **AND IT ALWAYS** will be needing something, I told this foundry engineer whose war contracts had him worried—until you use idlers that will take the kind of punishment you give them. That means, of course, *Rex Idlers!*

② **"DO YOU REALLY** think that they can give better service?" he asked me. "If they can, we'd better get them, because delays now for repairs just can't be tolerated—we *must* keep to our tonnage schedule!"

③ **WELL, THEY CAN!** Foundry men the country over, where quality and dependable service are the first requirements, will tell you how they depend on Rex's rugged reliability and long life. "Second to none," they say.

④ **THE SECRET IS** their design. With their precision, inner-tube-alignment bearings, triple sealed against dust or against oil leakage, they have eliminated a lot of the old worries due to rotting belts and early weave and wobble.

⑤ **AND REMEMBER THIS**—if it ever becomes necessary to replace a Rex idler roll—you buy the roll only. You don't have to buy a complete new unit, because rolls are interchangeable in the same frames. That saves hard cash, too!

⑥ **"WELL, THAT ALONE** is enough to make me consider Rex very seriously. We're having a lot of trouble with these because we must replace the entire unit. I'll check up and chances are you'll find an order from me before very long."

Rex idlers are seeing extensive service in busy foundries these days. The Rex man can help you apply them to your war production plans to best advantage. Naturally, orders bearing highest priority distinction take precedence. Chain Belt Company, 1716 West Bruce Street, Milwaukee, Wisconsin.

REX CONVEYORS

CHAIN BELT COMPANY OF MILWAUKEE

Baldwin-Duckworth Chain Belt Division, Springfield, Massachusetts • Worcester, Massachusetts
Rex Chain Belt and Conveyor Divisions, Milwaukee, Wisconsin

REX CHAIN BELT COMPANY

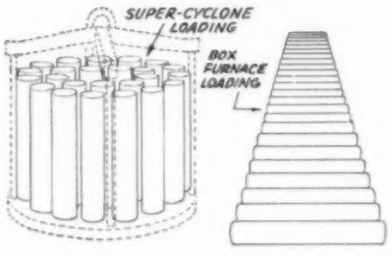
All the advantages of 100% forced convection heating in the hardening, normalizing and annealing range with the

LINDBERG SUPER-CYCLONE

The first furnace of its kind, employing 100% forced convection heating with a temperature range from 250° F. to 1750° F., the Lindberg developed Super-Cyclone is an ideal furnace for hardening, normalizing, annealing, tempering or nitriding. As a result of the 100% forced convection heating principle, production is increased, distortion minimized, material handling is reduced and less floor space is required to handle the same or increased production over conventional equipment.

INCREASED PRODUCTION

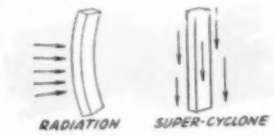
"Worm gear hardening *3 times greater* . . . bearing race hardening *7 times greater* . . . gray iron casting annealing *12 times greater.*" You can figure the Super-Cyclone's



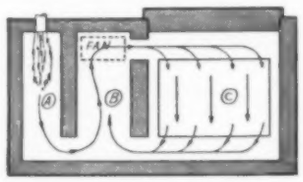
production possibilities in your own shop by spreading an average load of parts on the floor, one layer thick, as handled in a radiation type box furnace. Measure the area required. Take another load of those same parts and stack them up in a 36" circle, 4' high, making allowance for spacers or supports. Figure it will take a maximum of 3 hours to heat the load and 5 minutes to quench. Ordinarily you will find, by comparison with the laid out parts, that the Super-Cyclone will handle larger loads in the same or less time with a consequent increase in production, in some cases as high as 1200%.

KEEPS WORK STRAIGHTER

"Worm gear straightening is reduced from 85 out of 100 to 10 out of 100, thus saving 7½ hours straightening time per 100 gears." Rings that were previously heated and quenched individually on special jigs to hold them round, are now heated in a Super-Cyclone and quenched, 63 at a time without jigs, and held well within the acceptable range of .010".



The 100% forced convection heating principle of the Super-Cyclone heats the work rapidly and uniformly by driving heated air through the charge at high velocity. The heat source is confined to a chamber (A) away from the work (C) and separated by the fan chamber (B), thus preventing radiant heat of a source hotter than the



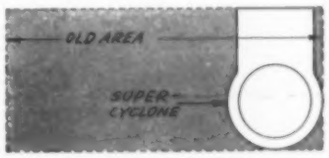
desired work temperature from striking the charge and causing distortion. As a result, valuable man hours are saved from the straightening press and made available for other work.

REDUCED HANDLING

The use of a fixture in the Super-Cyclone eliminates the individual handling of pieces throughout the heat treating process. The parts are loaded onto the fixture and remain there during the heating, quenching and tempering stages. And too, in reducing distortion to a minimum, the Super-Cyclone eliminates extra handling of work for straightening.

LESS FLOOR SPACE

Based on averages of what the Super-Cyclone has done in other plants, you can figure that it will require not more than ⅓rd the floor area demanded by conventional equipment to handle the same or increased production. In one plant alone, *a Super-Cyclone replaced 8 box type furnaces and turned out twice as much work!*



The Super-Cyclone's efficiency of operation, savings in man hours through the reduction of handling time and distortion, and the economy of floor space, makes it an ideal furnace for the large or small shop.

The Super-Cyclone is made in a wide range of sizes from 16" diameter by 20" deep to 72" diameter by 84" deep. Most are gas fired although a number are available electrically heated.

Write today for Bulletin 130 or ask to have the Super-Cyclone explained to you at the Lindberg Booth, National Metals Congress, Cleveland, October 12 through 16.

LINDBERG ENGINEERING COMPANY

2453 WEST HUBBARD STREET — CHICAGO, ILLINOIS

CYCLONE FOR LOW-COST ACCURATE TEMPERING

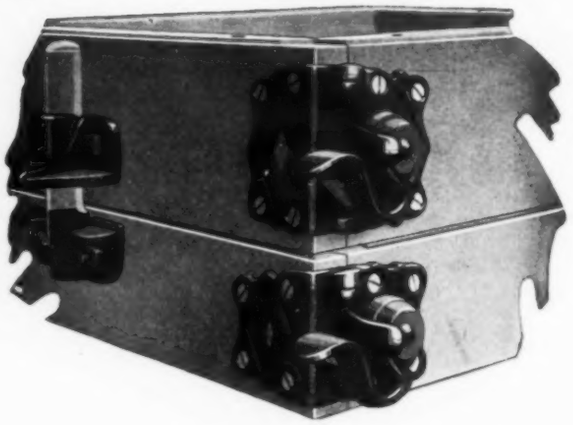
LINDBERG FURNACES

HYDRYZING FOR SCALE-FREE AND DECARB-FREE HARDENING

A *Real* INVESTMENT FOR MORE PRODUCTION!

DIAMOND FLASKS

No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

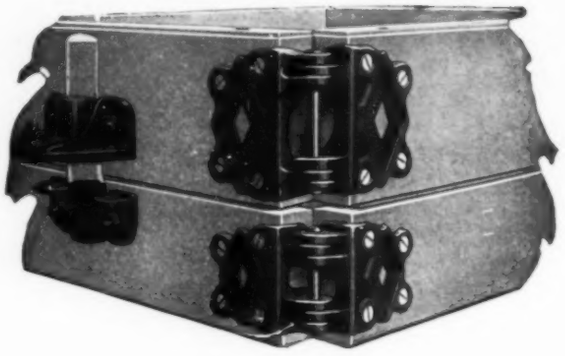


- **A SUPERIOR LATCH (exclusive)**

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.



- **A PATENTED HINGE (exclusive)**

  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

SAFCO CORE OILS
for peak production

Production up 20% . . . up 30% and more!* Many reports like these are coming in from important war production plants who have tested Swan-Finch 'SAFCO' Core Oils.

As needs become *more* exacting . . . faster baking, less cleaning of core boxes, reduced core losses, fewer 'blows' and rejects, 'SAFCO' Core Oils become *more* in demand than ever.

The rapidly increasing use of 'SAFCO' Core Oils to meet increased production demands is due to our background of cumulative experience . . . over 30 years continuous research in formulating, developing and applying core oils.

Every day our field men are *proving* thru tests and recommendations that 'SAFCO' Core Oils can save time . . . *can increase production.*

It will pay you real dividends to get better acquainted with the Swan-Finch field representative who covers your district. Capable and able, they are constantly devising *new* ways and means for stepping up production.

For instance meet Howard Rose. He is one of our highly trained and experienced fieldmen. ASK US TO HAVE HIM CALL—NO OBLIGATION.

**Reports in our files on core oil operations sent upon request.*

SWAN-FINCH OIL CORPORATION

Offices		Plants	
New York City—Executive Offices	R.C.A. Building, West	Newark, N. J.	120 Lister Avenue
Chicago, Ill.	201 North Wells Street	Chicago, Ill.	5849 West 66th Street (Clearing, Ill.)
Detroit, Mich.	2596 Hart Avenue	Detroit, Mich.	2596 Hart Avenue

IF YOU WANT *High Strength* AND *High Permeability*, THEN CONSIDER **DIXIE BOND**. IT IS, WE BELIEVE, THE STRONGEST BOND CLAY EVER OFFERED AMERICAN FOUNDRYMEN.

EASTERN CLAY PRODUCTS, INC.
EIFORT, OHIO

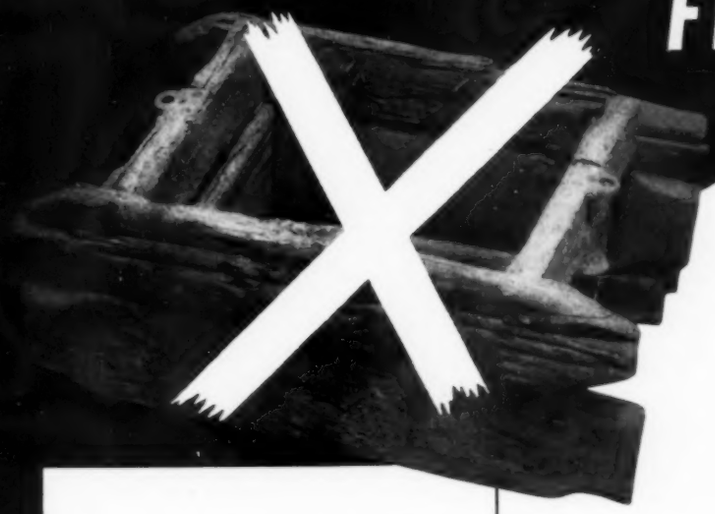
EASTERN CLAY PRODUCTS, INC.
SEVEN full-time service engineers are ready to help you adapt Dixie Bond or one of ECP's four other bonding clays — or any one of their almost countless combinations — to your exact requirements.

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

ECP *All* TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

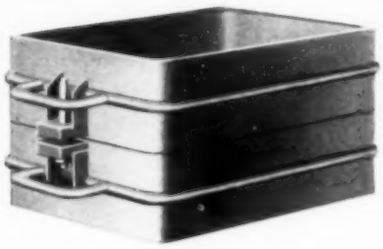
Save 15% of Your FOUNDRY FLOOR SPACE



Compact Steel Flasks, Built by Sterling, are Today Speeding the Production of Vital War Materials!

ABOVE — Old-fashioned wooden flask with thick, bulky walls and long, protruding, splintery handles.

BELOW — Modern Sterling steel flask with compact reinforced, all-welded construction. Saves 15% of foundry floor space.



In these strenuous war days, space is at a premium in practically every foundry in the country. So why plod along with bulky, destructible wooden flasks? Now, more than ever, it's necessary to modernize your foundry by using STERLINGS — the compact, steel flasks, soundly engineered for the super-speed and endurance so vital in these 24-hour work days. Solid, all-welded construction assures a long life of dependable service at low cost. That's why STERLINGS are the preferred flasks in more than 3500 foundries.

Sterling FOUNDRY FLASKS

Flasks available in all styles and shapes . . . all-welded, special rolled steel sections . . . strong but light, for speed and endurance.

STERLING WHEELBARROW COMPANY • MILWAUKEE, WIS., U. S. A.

More than 65 Super Refractories to choose from . . .

BUT ONLY ONE IS RIGHT FOR A GIVEN APPLICATION!

TODAY as furnaces and kilns are pushed to meet production schedules, more and more operators are turning to super refractories as an economic necessity. But the best super refractory may be useless if improperly applied.

The number of super refractories made by Carborundum has grown to more than sixty-five standard and modified varieties. Each is designed to withstand special conditions. But only *one* is *right* for a given application.

With so many varieties to choose from, how can you be sure of picking the right one? Obviously that's a problem that calls for specialized experience and knowledge.

Due to their wide background of practical and technical skill, our refractories engineers know how to specify the super refractory or combination of super refractories that will fit your job. Your furnace requirements are considered as an individual problem. By giving you a super refractory installation "tailor made" to your needs, we help you obtain continuous maximum furnace output.

So why not call on Carborundum for this advisory service now. We will be glad to make certain that the right super refractories for longest life, maximum production and highest efficiency are being used in your furnace. We can make reasonable deliveries to industries engaged in war work.

REFRACTORY CARBORUNDUM PRODUCTS

THE CARBORUNDUM COMPANY, PERTH AMBOY, N. J.

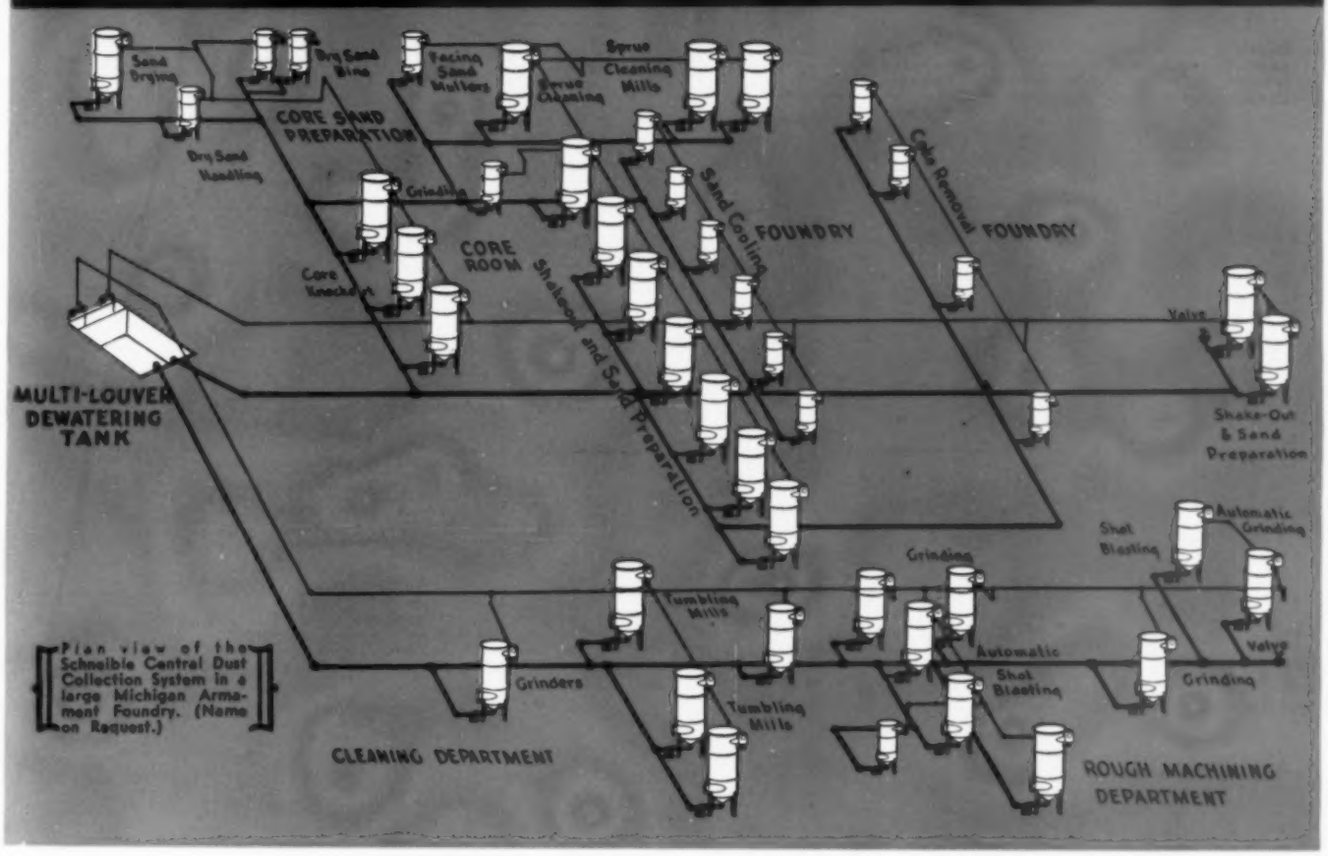
REG. U. S. PAT. OFF.

Refractory Division

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

This Continuous, Automatic Schneible Central System is the One Scientific Dust Collection Method!



Plan view of the Schneible Central Dust Collection System in a large Michigan Armament Foundry. (Name on Request.)

With the Schneible Multi-Wash Method, dust and fumes from various foundry operations are actually washed from the air. The sludge that results is pumped to gravity return piping and flows to a central dewatering tank. Here the settled and dewatered sludge is removed when a large enough quantity has accumulated. High operating efficiency is constant. Operating labor and maintenance are negligible. No need for cleaning out dust from each collector—no mess—no bother—nothing to clog, clean or replace—just continuous automatic, quiet operation.

Schneible Multi-Wash Dust Collector Systems are made for foundries of every size, from the largest—such as the huge armament foundry shown in the layout above—to the smallest.

Send for bulletin explaining why collecting dust and fumes the Schneible Way costs so *little!*

Schneible Multi-Wash Collectors are made in many models in sizes from 350 to 30,000 c.f.m. capacity and multiple units for efficiently controlling dust, fumes and odors.

CLAUDE B. SCHNEIBLE COMPANY
3953 Lawrence Avenue, Chicago, Illinois
Offices in Principal Cities

SCHNEIBLE

Heating Furnace Designed and Built in 3 Days!

Here's a report from G. W. Heald, Chief Engineer, The Ramtite Co., that will be of special interest to operators of industrial furnaces changing over to war production work.

INTER-HOUSE LETTER

THE RAMTITE CO.

TO Chicago Office

FROM G. W. Heald

ATTENTION G. V. Campbell

COPIES FOR

SUBJECT ..... Corporation

DATE 5-15-42

Is the follow up date for this subject. Please answer before then and as soon as possible.

FORM SC 13-1-42-O.P.

In response to the emergency call from the ..... Corporation last Thursday, I left that same night and arrived at their plant Friday at 9:00 A.M. These people are making 100 pound bombs and were having heating furnace trouble. Their furnace could scarcely keep up with one of their two presses. After studying the operation they turned me loose on a drafting board in their office. My drawing was completed before 5:00 P.M. the same day. Meanwhile I had them start fabrication of the steel framework and construction of the necessary wood forms. Also before completion of the drawing I ordered delivery of the Ramtite and other necessary materials and instructed Charlie (Mason Foreman) to report here Saturday morning. The following Monday morning the new furnace was in operation and was heating stock more rapidly than necessary to keep both presses going.

OUR BUSINESS IS THE manufacture of refractories and the design and construction of industrial furnaces used in forging, heat treating, annealing, etc., and from the above report you will see that we are prepared to deliver in a hurry.

We have three factories manufacturing Ramtite and other refractory specialties and can make immediate shipments of almost unlimited quantities. Ramtite is particularly well suited for use in industrial furnaces. The furnaces can always be designed for the particular job that they will be used for without having to give consideration to special shaped fire brick. Because of its high insulating value and its ability to stand up under hard service, Ramtite construction combines the best features of fire brick construction and insulating fire brick construction.

Send for booklet "Ramtite for Industrial Furnaces," which contains complete engineering information on Ramtite and drawings of typical installations.

THE RAMTITE CO.
Division of The S. Obermayer Co.
1803 SOUTH ROCKWELL STREET
CHICAGO, ILL.

RAMTITE

Elevated Shakeouts
eliminate pits—simplify maintenance

• Through the use of a special Bartlett-Snow "universal jointed" chain—that flexes easily in any direction, yet avoids the point contact of open link chain with resulting wear and loss of pitch—it is now possible to flex a mold conveyor not only horizontally, but up and down inclines as well.

As illustrated above, this permits the shakeout to be located overhead—eliminates the time and cost of building a pit—simplifies installation—and permits the equipment to be arranged to best possible advantage, unhampered by underground piping, etc. The overhead shakeout permits sand, cartridges and flasks to be removed from the shakeout easily, with a minimum of equipment. Lubrication and maintenance are much simplified, and the shaking out of the molds, and knocking out of the cores can sometimes be combined.

Also,—with these multiple flexing mold conveyors, the "cooling run" of the conveyor can be carried in a tunnel below floor level—simplifying dust and fume control, and permitting easy access to the inside of the mold conveyor loop.

Our recently completed 40-page Foundry Bulletin No. 91 describes many different types of Bartlett-Snow mold making, mold conveying, and other foundry equipment... No obligation... Send for a copy today!

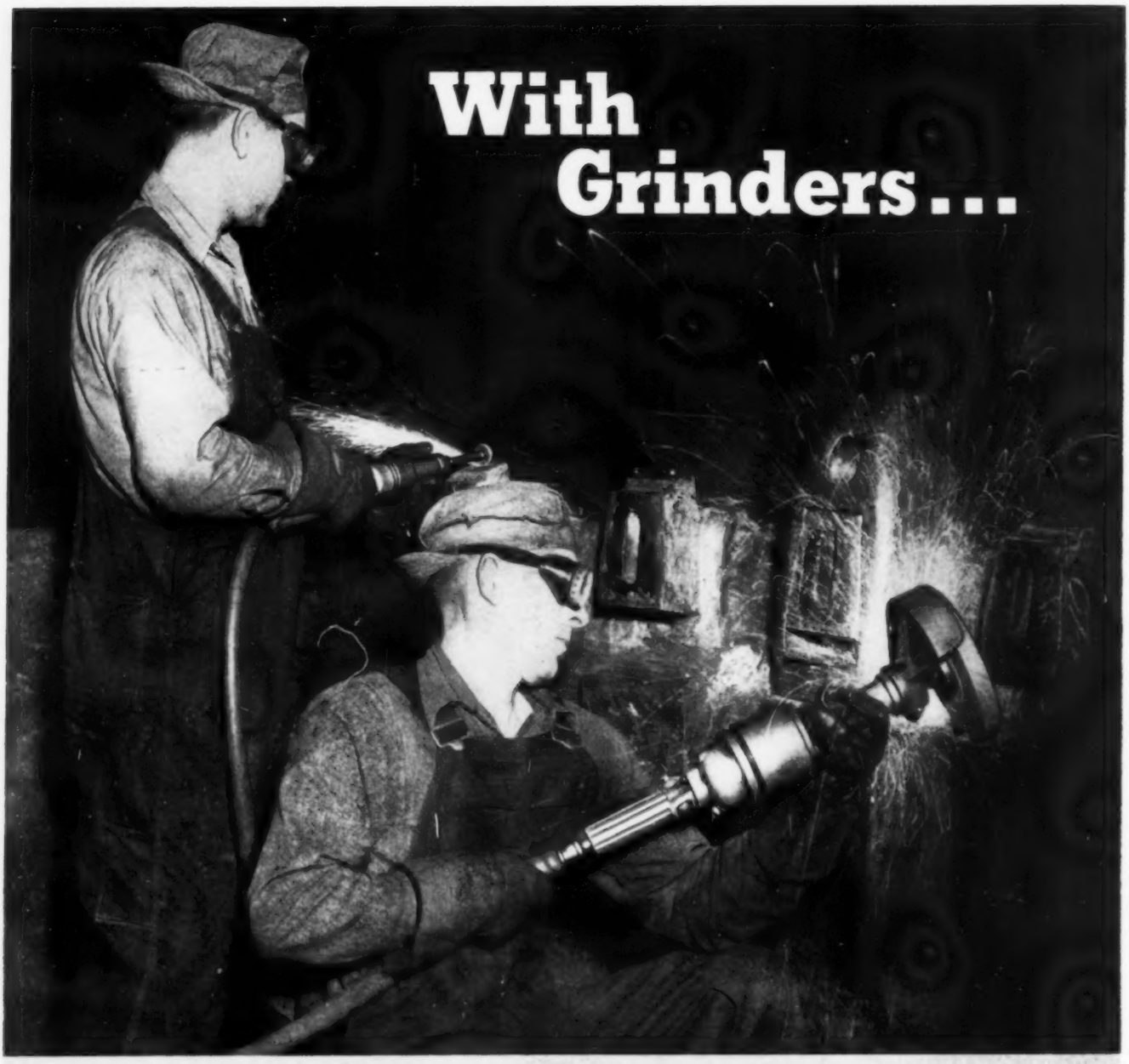
THE C. O. BARTLETT & SNOW COMPANY
6201 Harvard Avenue Cleveland, Ohio
Engineering and Sales Representatives in the Principal Cities

100% War Bond Buyers
Average Payroll Deductions—14%
H. S. Hovey
PRESIDENT

BARTLETT-SNOW
ENGINEERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

Complete Sand, Mold and Castings Handling Equipment for any requirement, including

Shakeouts	Elevators	Aerators	Sand Distributors	Bins and Feeders	Apron Conveyors	Dust Collectors



It's Metal Removed Per Shift That Counts!

With Ingersoll-Rand "Multi-Vane" Grinders you get maximum grinding efficiency. Their design incorporates three most important features—great power—light weight —and sensitive control. With these modern air tools your operators can do more work with less fatigue — remove more metal in less time.

8-97

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You don't Need the

BIG STICK

When you have Herman Molding Machines batting for you, you'll have no need to use the "big stick" to force production levels up.

Today Hermans are helping thousands of foundries throughout the Allied Nations produce more molds and essential castings than was ever dreamed possible—and at greater speed, with less power, and at lower cost.

These may read like "dream phrases" to you—but if you want to satisfy that urge to do something about increasing your mold production, drop us a note and ask us for proof of what Hermans are doing to help other foundries play an important part in our War Effort—and what they can do to help you. No obligation.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

YOU ARE HELPING THE WAR EFFORT WHEN YOU SHOW SAVINGS IN YOUR PRODUCTION COSTS

SAVE UP TO 50% IN YOUR TUMBLING

This is no idle boast like Nazi or Jap propaganda . . . . it's the real McCoy . . . . solid truth based on actual production charts which prove that RANSOHOFF TUMBLING MILLS split costs like bombs from a Flying Fortress.

RANSOHOFF TUMBLING MILL

speedy . . . . gentle . . . . cost-saving automatic handling of stars

The Ransohoff Method

Castings are cascaded in a mass, without void spaces, in which the stars are thoroughly intermingled. This mass movement produces faster cleaning without nicking, breakage or excessive mill wear. Stars enter and return from tumbling chamber automatically.

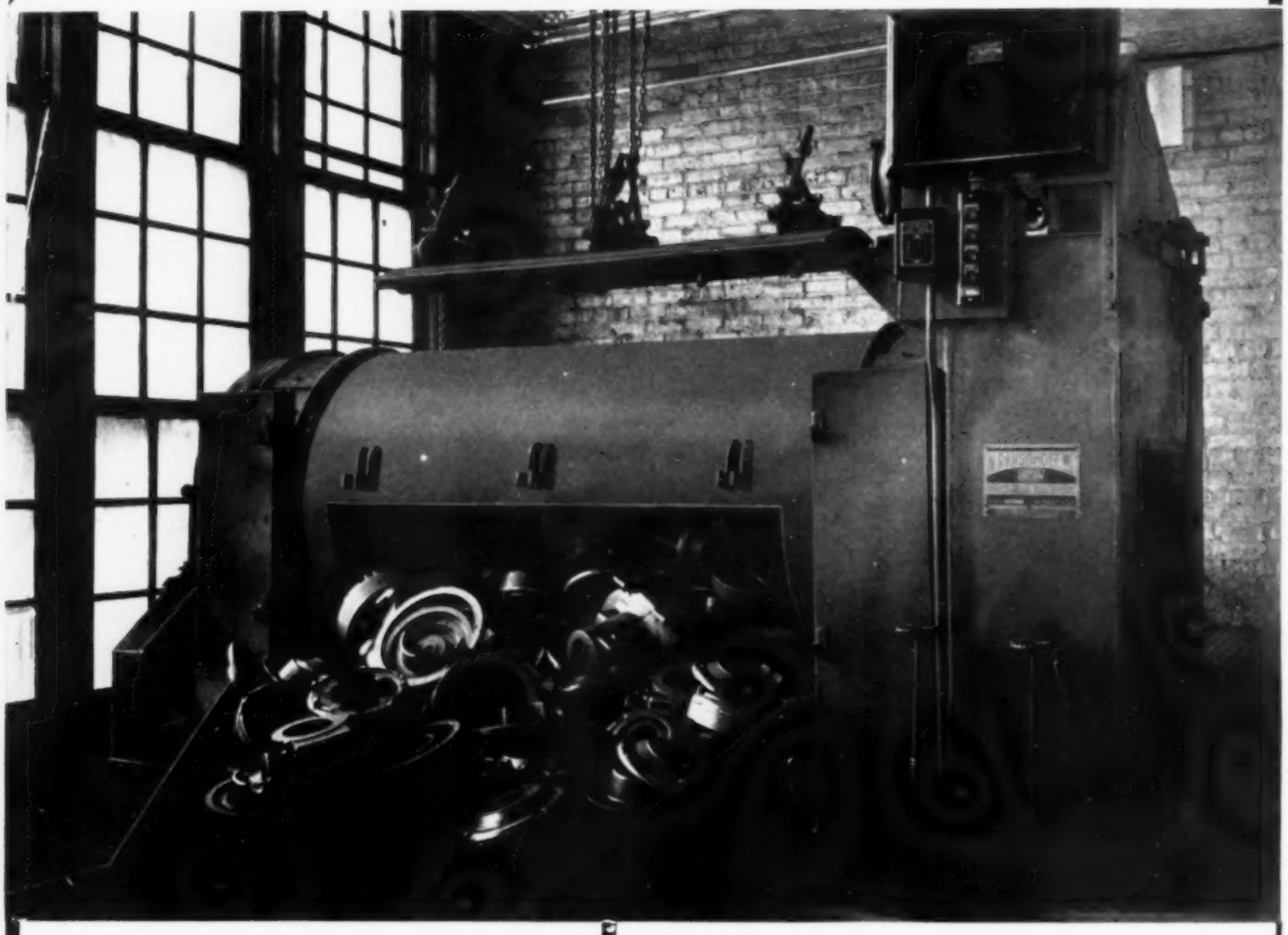


Illustration shows Ransohoff Star Return Tumbling Mill used by Pyle-National, Chicago.

Write for data.

TOWNSHIP AND BIG FOUR R. R.

N. RANSOHOFF, INC.

CINCINNATI, O.

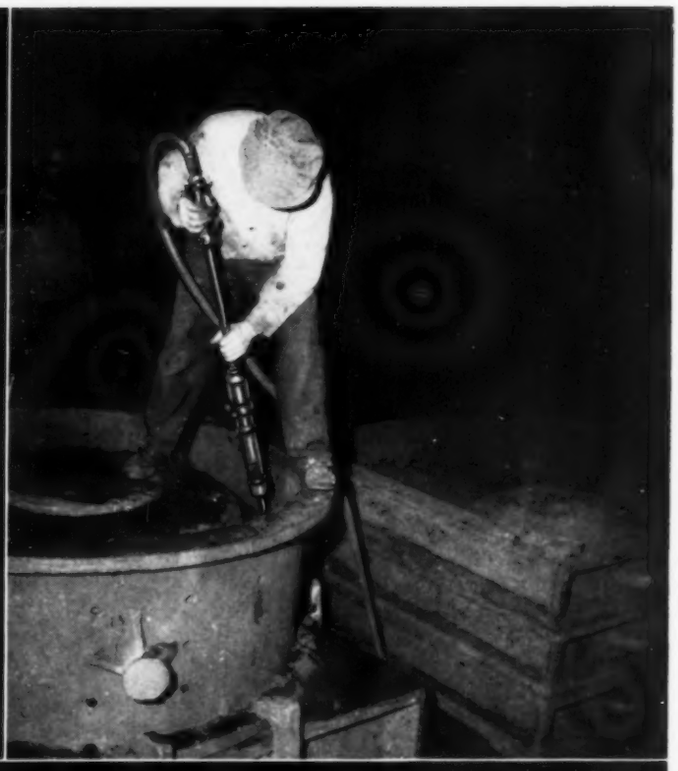
PATTERN PLATES
CORE PLATES
BOTTOM PLATES

Our Steel pattern plates, core plates and bottom plates *stay* flat. They are durable and you can get them without undue delay. Their increasing usage fits them closely into current high production foundry schedules. Why not get in touch with us today?

MOLTRUP STEEL PRODUCTS CO.
(BEAVER FALLS, PA. Pittsburgh District)

STEEL PLATES LAST FOR YEARS

MOLTRUP



CLECO SAND RAMMERS

Improve QUALITY of Castings by insuring uniform mold density—

★ The Cleco line of Sand Rammers includes nicely balanced, highly efficient tools for every kind of molding job—for floor, flask, bench and core work. In addition to being labor savers of immense value, they greatly improve the quality and uniformity of castings.

The valves for these rammers are end-pressure-seated; there is no valve wear to cause loss of power. All models have poppet type throttles that are leak-proof and trouble-free. Large oil chambers insure efficient lubrication at all times.

Workmen like Cleco Rammers because they are well balanced and operate with minimum vibration. The tool carries its own weight when working, the molder only needs to guide it to the work.

Cleco Rammers will help you produce *better* castings in *less* time. Write now for Bulletin 76A.

● Cleco No. 4 Floor Rammer. Note the slim, smooth shape and the convenient throttle latch or rigger.

●*Other useful Cleco tools for the foundry include complete lines of chipping hammers and grinders.*

THE CLEVELAND PNEUMATIC TOOL CO.

BRANCH OFFICES IN ALL PRINCIPAL CITIES

MARBLE AVE., AT EAST 77th ST. CLEVELAND, OHIO

. . . A NEW *Scientifically Developed* NON-FERRUSKOAT CORE WASH *to* STEP UP PRODUCTION *of* VITALLY NEEDED NON-FERROUS CASTINGS

Note the important features of this new, easy-to-use DELTA development for faster production of non-ferrous castings;

MOISTURE PROOF: When thoroughly dried will not absorb moisture.

NO PRECIPITATION: When properly mixed will stay in suspension indefinitely.

HIGHLY REFRACTORY: Molten metal lays on surface without the least disturbance.

NO GAS: It is non-reactive with molten metal and liberates no gaseous vapors.

ADHERES TO SAND SURFACES: Penetrates into sand surfaces, prevents flaking, peeling, scabbing when in contact with molten metal.

EASY TO APPLY: May be sprayed, swabbed, dipped or brushed onto either green or dry sand surfaces.

PRODUCES SMOOTH SURFACES: Casting surfaces are free from burn-in or metal penetration.

CUTS CLEANING ROOM COSTS: Surfaces are smooth and require a minimum amount of cleaning.

ECONOMICAL TO USE: Covers greater surface areas than other washes.

DELTA NON-FERRUSKOAT has been proved in actual use in many of the Nation's leading foundries now producing the finest non-ferrous castings for the war effort.

The wide and ready acceptance of DELTA Products for the Foundry is convincing proof of the ability of DELTA Research Laboratories to keep step with the rapidly advancing demands of the war program. Night and day, DELTA resourcefulness is working for YOU and for the common cause to which we are all dedicated . . . TO PRODUCE THE MOST OF THE BEST in the SHORTEST POSSIBLE TIME.

Don't hesitate to ask for information. Write today!

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF

INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE WISCONSIN

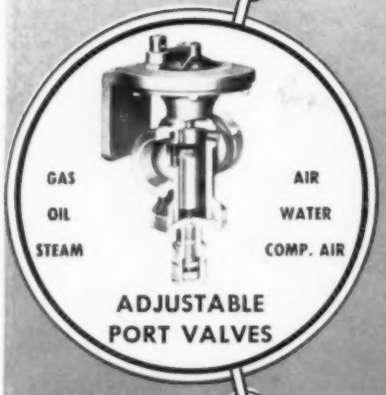
NORTH AMERICAN
COMBUSTION EQUIPMENT

Will save fuel for your country and your company!

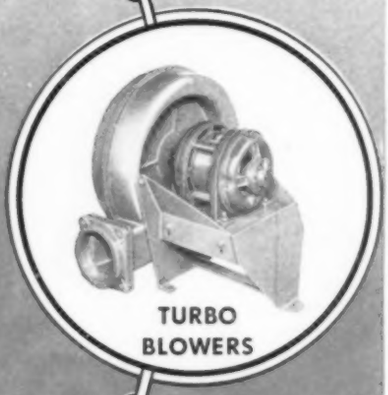
GAS BURNERS

OIL BURNERS

DESIGNED
TO WORK TOGETHER
AS A UNIT GIVING YOU
ONE
SOURCE OF SUPPLY
ONE
RESPONSIBILITY



ADJUSTABLE PORT VALVES



TURBO BLOWERS

SENSITROL OIL and BUTTERFLY AIR VALVES

RATIOTROLS and REGULATORS

Why not consult a North American representative?

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES
CLEVELAND, OHIO

Constant . . . . Development

Attention to Detail makes

FANNER CHAPLETS AND CHILLS

the Finest Procurable

• NOTE •
WE HAVE OVER
100,000,000
IN
STOCK

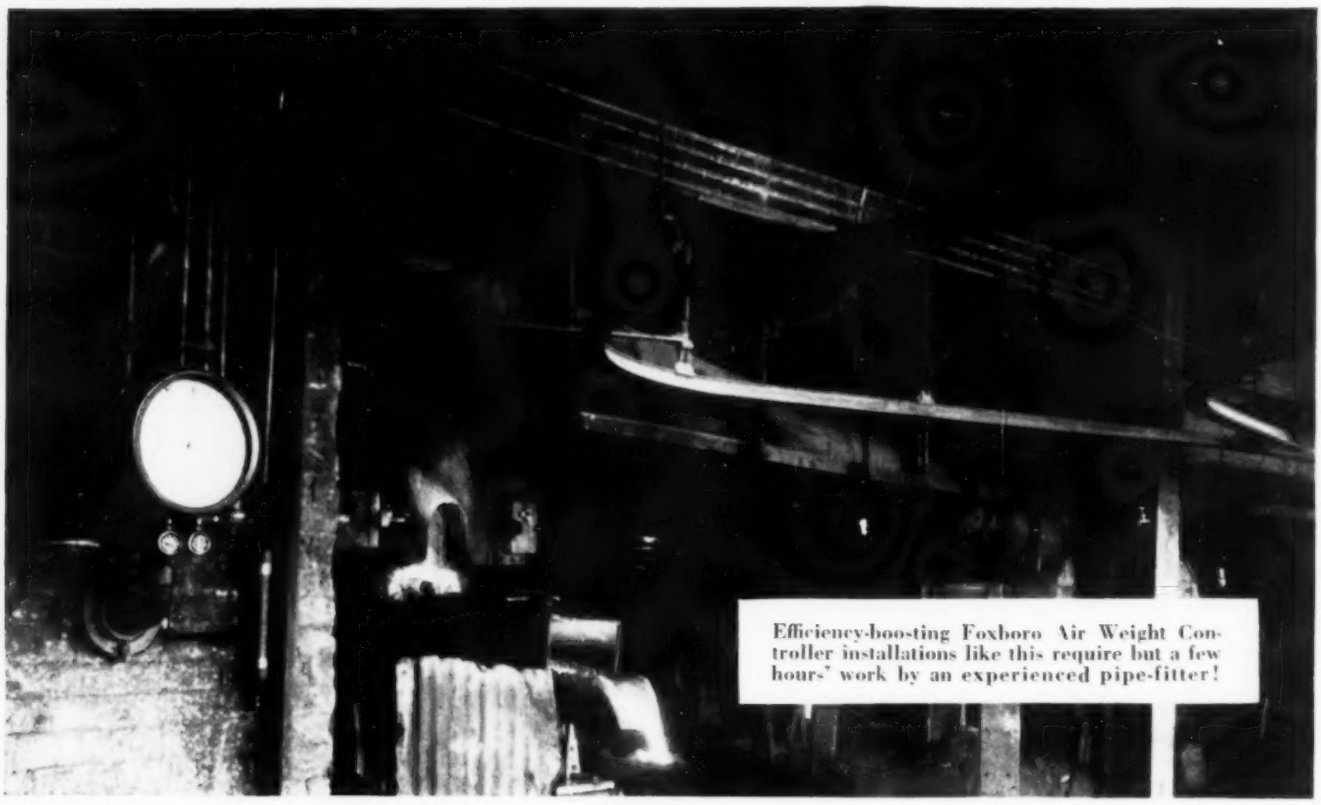
THE FANNER MANUFACTURING CO.

BROOKSIDE PARK • • • CLEVELAND, OHIO

CANADIAN FANNER, LTD.
HAMILTON, ONTARIO

This "Phantom Foundryman"

SAVES PIGGING AND REJECTS!



Efficiency-boosting Foxboro Air Weight Controller installations like this require but a few hours' work by an experienced pipe-fitter!

Easily-installed Foxboro Controller keeps heats hotter, more uniform.

Every day is a "good pouring day" where cupolas are equipped with a Foxboro Air Weight Controller. This "phantom foundryman" automatically controls the blast to supply a constant *weight* of air per minute, regardless of the blast-line pressure, atmospheric temperature or barometric pressure!

All you do is set the index pointer on the instrument for the desired blast. From the first tap to the last, you'll get consistently better combustion . . . hotter heats with less burning . . . uniform pouring conditions that reduce imperfect castings and practically eliminate pigging.

Write for Bulletin B-268 on Foxboro Air Weight Controllers, or for detailed information on any other instruments you may need. The "Phantom Foundryman" is only one example of Foxboro's Creative Instrumentation to make industrial processes operate more productively. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Mass. U. S. A.** Branches in principal cities of U. S. and Canada.

RECORDING · CONTROLLING · INDICATING

FOXBORO
REG. U. S. PAT. OFF.
Instrumentation

Mr. War Manufacturer:

DO YOU NEED HELP...

WITH ANY PROBLEMS PERTAINING TO SAND AND ITS USE IN THE FOUNDRY

?

Schundler has the largest technical staff in the Bentonite Industry—men who have broad training and experience in foundry practice and operation—men who have given much valuable assistance to foundries. Here are just a few acknowledgments of their assistance:

Saved Several Hundred Dollars

"We were having some trouble with porosity in our castings and he gave us information which helped us out of the trouble in very fine shape, and we were very much surprised at the saving we have made. It amounts to several hundred dollars per month."

He Gets Us Out of Trouble

"We have come to the point that we depend on his advice when we get into trouble."

Outstanding Man on Sands

"There is no question at all but what you chose the outstanding man in the entire industry for this particular work."

Everybody Pleased

"I have heard nothing but good comments from everybody we contacted, and they all agree he was one of the best speakers who ever spoke before our association."

A Lot of Information

"We did get a lot of information which will be beneficial to us."

Best Man on Sands

"I want to say that.....is the best man on sands and the use thereof, that has visited this section and the foundrymen here appreciated his efforts in helping them as he did.

If so, tell your troubles to the Schundler technical men. The chances are they can help you. There is absolutely no charge or obligation for preliminary suggestions and consultations. Perhaps a field man can make a complimentary call at your plant.

24 Hour Service
TO MOST FOUNDRY CENTERS

Akron, Ohio	H. S. Stoller
Birmingham, Ala.	Foundry Service Co.
Boston, Mass.	Klein-Farris Co., Inc.
Chattanooga, Tenn.	Frank Robbins, Jr.
Chicago, Ill.	B. J. Steelman
Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
Edwardsville, Ill.	Midwest Foundry Supply Co.
Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N.Y.	F. E. Schundler & Co., Inc.
Los Angeles, Cal.	Independent Fdry. Supply Co.
Milwaukee, Wis.	Thomas H. Gregg
Minneapolis, Minn.	Smith-Sharpe Co.
Moline, Ill.	Midwest Foundry Supply Co.
New Orleans, La.	Barada & Page, Inc.
Oklahoma City, Okla.	Barada & Page, Inc.
Philadelphia, Pa.	Penn. Fdry. Sup. & Sand Co.
Portland, Ore.	Miller & Zehrung Chemical Co.
St. Louis, Mo.	Midwest Foundry Supply Co.
Oakland, Cal.	Industrial Supply Co.
Seattle, Wash.	Carl F. Miller & Co.
Toronto, Canada	Muir Foundry Supply Co.
Tulsa, Okla.	Barada & Page Supply Co.
Wichita, Kans.	Barada & Page Supply Co.
Mexico D. F., Mexico	N. S. Covacevich

Quality Products for Foundries

BENTONITE In this field, Schundler is a leader.

FESCO FIRE CLAY A top quality fire clay for cupola and ladle linings.

FESCO BOND A bonding clay of the first order. Excellent record of performance.

TALC (Soap Stone) Equal in quality to the best imported products.

Schundler

F. E. SCHUNDLER & CO., INC. 520 Railroad Street, Joliet, Ill.

DO IT FAST - DO IT RIGHT

WITH SPO *Molding Machines*

THE SPO No. 506 MOLDING MACHINE

Skilled molders are getting scarcer all the time. If unskilled labor can "take over" successfully, that releases specialized workers for tasks which they alone can handle . . . With the SPO Jolt Rock-over Patterndraw Machine you can thus conserve man power. Using it, employees with but little experience can turn out good molds very fast and very cheaply.

Onto this versatile performer you can throw a whole stack of odd jobs. Patterns can be changed so easily as to account for a wide variety of castings in a day. Those pesky short orders, down to five molds apiece—you can accept them now and show a nice profit.

FEATURES—Hard, powerful jolt for heavy, continuous service. Smooth rock-over which needs no valve-juggling. Accurate draw. Entirely air-operated. One valve controls air clamp and levelling device for safety. Rock-over table is held rigidly in both jolting and pattern draw positions.

Here is equipment suited alike to steel, iron and non-ferrous operation, especially where patterns must be changed often. SPO engineers, thoroughly trained in foundry practise, will be glad to talk production with you.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

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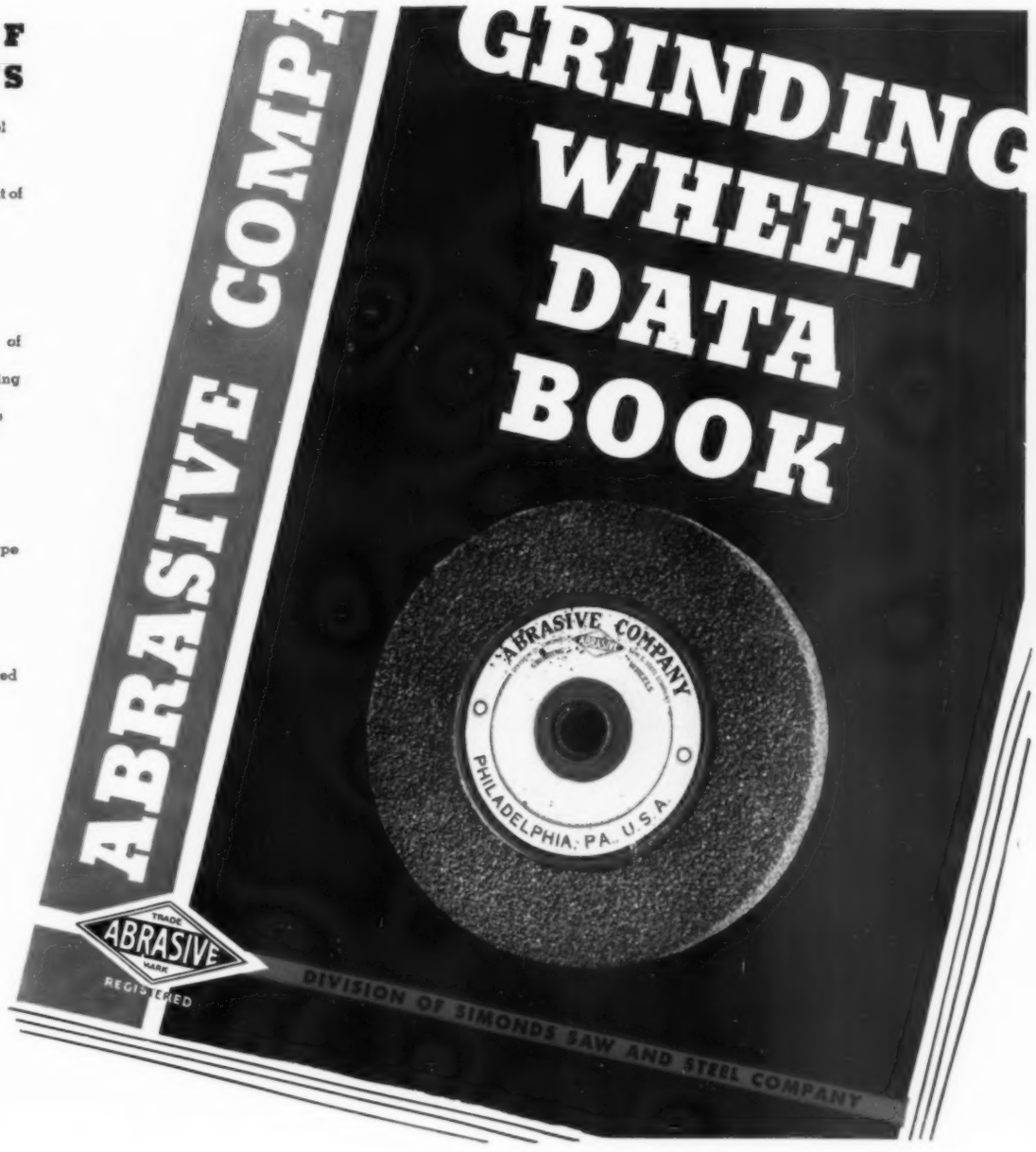


You Should Have This Valuable Handbook on MODERN GRINDING

Sixth Revised Edition . . . 120 pages of useful information for production men concerned with grinding. Contains complete descriptive data about the use and application of grinding wheels . . . including comprehensive wheel selection table giving grain and grade recommendations for all standard grinding classifications.

Grinding is an extremely important manufacturing operation in the War Production Program. This convenient Data Book will provide a ready source for factual information that you will need for most efficient production. Send for copy now!

It's Free

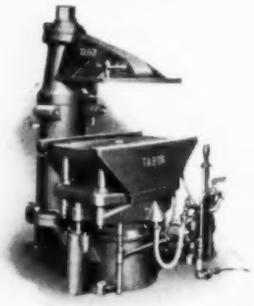
ABRASIVE COMPANY TACONY & FRALEY STS., PHILA., PA.
Division of Simonds Saw and Steel Co.

Please send me the new **GRINDING WHEEL DATA BOOK**

NAME_____ TITLE_____

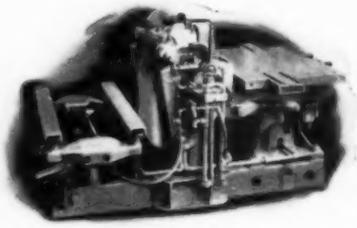
COMPANY_____

ADDRESS_____



Jar Squeeze Flask-Lift Machine (Pintle Post)

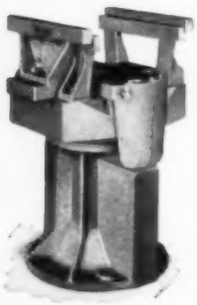
Trunnion Jar Rollover Pattern Draw Machine



Jar Ram Power Rollover Power Draw Machine. Table slots provide for use of air-operated flask clamps.

TABOR
TRADE 1885 MARK

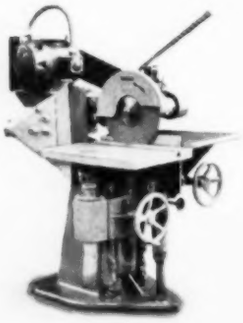
FOUNDRY MOLDING MACHINES



Jar Flask-Lift Machine

Column Jar Squeezer

Plain Jarring Machine



Tabor Foundry Molding Machines are not new to foundrymen. We have been designing, building and adding to the line for over half a century, to keep pace with changing foundry practice. That is why we are able to say again today without fear of successful contradiction:—"Tabor offers the right type of machine for any molding need".

SQUEEZERS • JAR SQUEEZERS • HINGED ROLLOVER MACHINES • TRUNNION ROLLOVER MACHINES • JAR FLASK-LIFT MACHINES • JAR SQUEEZE FLASK-LIFT MACHINES • PLAIN-JAR AND SHOCKLESS-JAR MACHINES

. . . and TABOR-BRASIVE CUT-OFF MACHINES

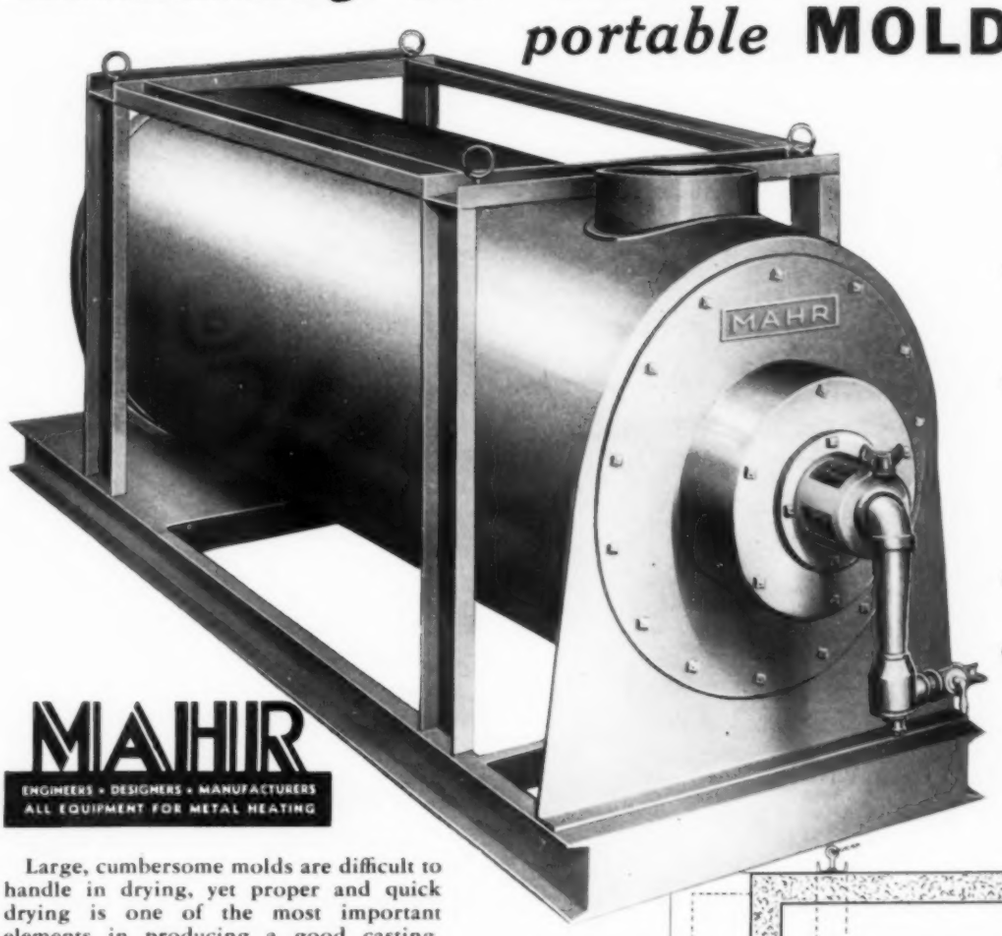
Save money, time and labor in cutting gates and risers from castings of manganese bronze, aluminum bronze, nickel, monel and other non-ferrous alloys, as well as alloy steel. Built in a complete line of sizes and types to meet any cutting need.

Write us regarding your foundry machine requirements.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: *Los Angeles, Calif.,* Snyder Foundry and Supply Co.; *Oakland, Calif.,* Pacific Graphite Co.; *Seattle, Wash.,* Carl F. Miller & Co.

Announcing the **MAHR High Efficiency** *portable* **MOLD DRYER!**



- **HEAVY STEEL CONSTRUCTION**
- **FAST HEAT-UP QUICK DRYING**
- **FOUR SIZES:**
  - 250,000 Btu Capacity
  - 500,000 Btu Capacity
  - 750,000 Btu Capacity
  - 1,250,000 Btu Capacity
- **OIL OR GAS FIRED**
- **PORTABLE**

MAHR

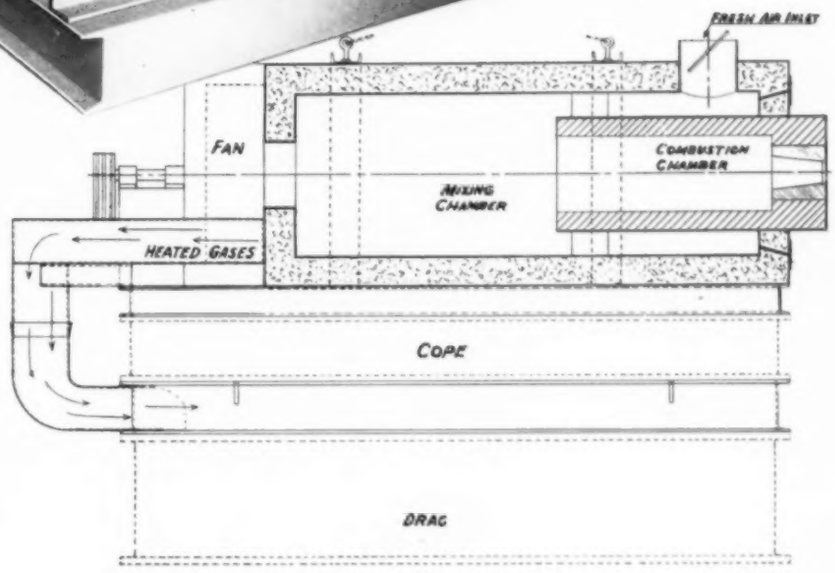
ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

Large, cumbersome molds are difficult to handle in drying, yet proper and quick drying is one of the most important elements in producing a good casting. After long and exhaustive study and tests of many drying methods in our own and other foundries, we are proud to announce this newest member of an old family.

Designed by an organization long experienced in industrial heat application, and thoroughly tested under everyday foundry conditions with outstanding performance results. Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are shortened.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion.

FOR OVER A QUARTER CENTURY, the name MAHR has been associated with industrial heat equipment of quality and the most modern design. These products include CORE AND MOLD OVENS, FURNACES OF ALL SIZES AND TYPES FOR ANNEALING, STRESS RELIEF, ETC., FORGES, TORCHES, BURNERS, BLOWERS AND VALVES.



WRITE, WIRE, OR PHONE FOR BULLETIN AND PRICES

Get our fully illustrated and descriptive bulletin telling all about this dryer. It can be used nearly every day in any foundry. With sub-contracts for many very large castings today, several foundries are already using batteries of these dryers with a great saving in time and costs. Write, wire or phone TODAY for complete information.

DIAMAHR

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

MINNEAPOLIS, MINNESOTA, U. S. A.

WASHED DRIED AND SCREENED SILICA SAND

Carefully Selected and Graded for Foundry Use—

FOUNDRY men throughout the country know the exceptional qualities of the uniformly screened grades of silica sand produced by the Ottawa Silica Company.

The grains being almost spherical, afford greater permeability and consequently finer sand can be used, effecting better finish.

Ottawa sands are durable! They do not break up! They are ideal for sand slinger work and are without equal for all foundry purposes where synthetic sands are employed.

FLINT
MOLDING AND CORE SAND
SILICA

A HARD, fast-cutting, thoroughly washed, dried Sandblast Sand, screened to uniform size, is produced by the Ottawa Silica Company and sold under the trade names FLINT SHOT and DIAMOND SANDBLAST SAND. It is the most economical agent that can be employed for all kinds of exacting sandblast cleaning. The round, pearl-like grains are hard as flint. They do not split up, but wear down uniformly and can be used over again many times. This abrasive flows freely, requiring less air power and gives the castings a smooth, silvery-like, velvety finish. Ask for our booklet, "Sandblasting Up To Date".

FLINT
IT PAYS TO USE
SHOT

DIAMOND
SAND BLAST

THE Ottawa Silica Company's three mills operate continuously the year round, making it possible to supply foundries with material promptly. Production includes a complete line of foundry sands suitable for molds, cores, furnace bottoms, sandblasting, for use generally in the steel, grey iron and non-ferrous fields—also Ground Silica (Silica Flour). The Ottawa Silica Company's engineering staff is always available for consultation and service on problems relative to the use of Ottawa Sands.

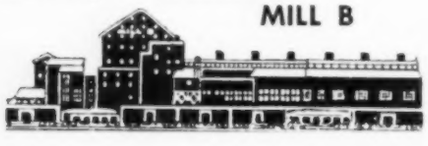
CRYSTAL
99 44/100 PURE
SILICA

OTTAWA SILICA COMPANY

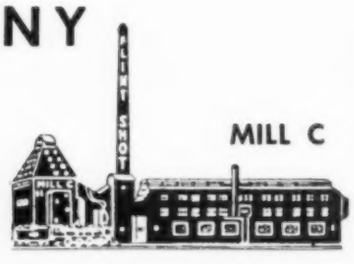
Ottawa, Illinois

MILL A

MILL B



MILL C



OFFICIAL U. S. NAVY PHOTOGRAPH

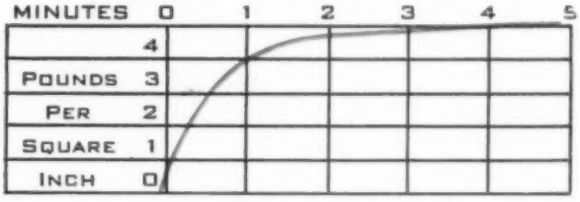
FASTER SAND TEMPERING *Speeds* VICTORY

CLEARFIELD SAND MIXERS *do the job!*

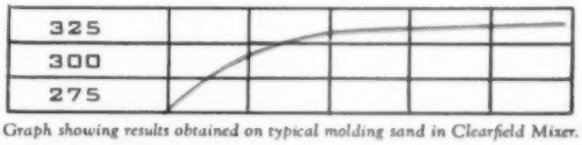
Clearfield Sand Mixers in many "Victory" foundries are speeding production by supplying completely prepared sand in record time. The efficient agitation and mulling principle of the Clearfield Mixer gives thorough mixing action and in many mixes produces *4/5 of the maximum bond strength* in the *first minute* of operation. This is often sufficient for the purpose . . . consequently, batches can be timed to as short as one-minute cycles.

The Clearfield Mixer produces early bond strength . . . excellent permeability . . . uniform grain . . . well-aerated, easy-working sands. These advantages speed mold and core preparation . . . improve casting finish . . . reduce faulty castings . . . speed the way for Victory.

GREEN COMPRESSION STRENGTH



PERMEABILITY



Graph showing results obtained on typical molding sand in Clearfield Mixer.

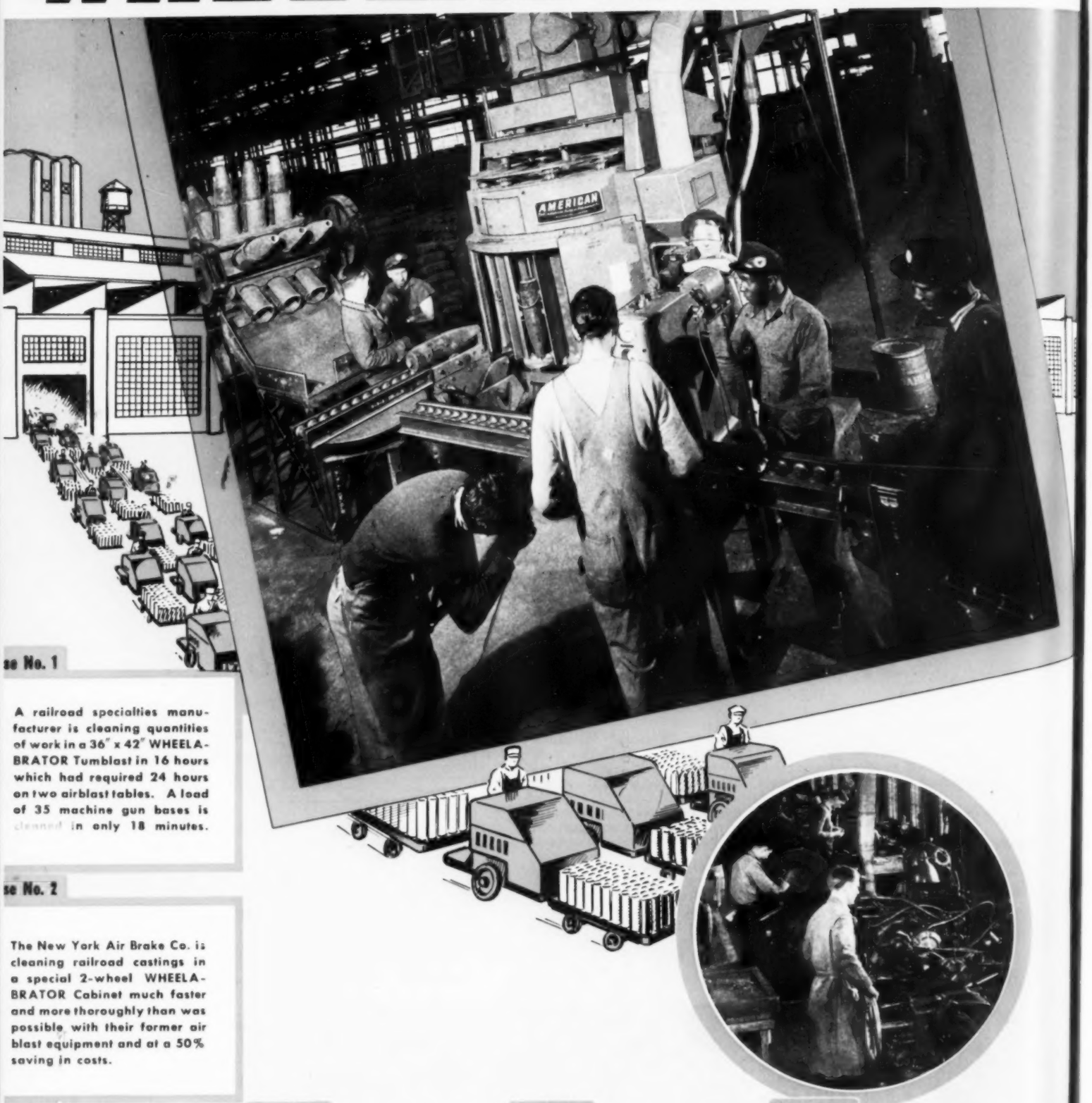
CLEARFIELD MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

(*Above*) Note the fast increase of compression strength in a typical foundry sand during the first two minutes of processing in a Clearfield Sand Mixer.

(*Above*) A high degree of permeability is obtained in foundry sands mixed in the Clearfield Sand Mixer.

WHEELABRATOR



se No. 1

A railroad specialties manufacturer is cleaning quantities of work in a 36" x 42" WHEELABRATOR Tumblast in 16 hours which had required 24 hours on two airblast tables. A load of 35 machine gun bases is cleaned in only 18 minutes.

se No. 2

The New York Air Brake Co. is cleaning railroad castings in a special 2-wheel WHEELABRATOR Cabinet much faster and more thoroughly than was possible with their former air blast equipment and at a 50% saving in costs.

se No. 3

A 48" x 48" WHEELABRATOR Tumblast load of annealed steel fittings and valves is cleaned in less than 30 minutes at Walworth Co., Greensburg, Pa. This amount of work formerly represented 8 hours' cleaning in a sand blast room.

Case No. 4

Brass and bronze castings weighing from 2 to 50 lbs. apiece are cleaned on a WHEELABRATOR Plain Tablast at Reliable Pattern and Castings Co., Cincinnati, Ohio, in one-fifth the time formerly required on an air blast table.

Case No. 5

Time-consuming air blast and tumbling equipment for cleaning brass sprinkler heads were replaced at Rockwood Sprinkler Co., Worcester, Mass., by a 15" x 20" WHEELABRATOR Tumblast which decreased cleaning time 75%.

Case No. 6

A 6' WHEELABRATOR Plain Tablast installed at a Cleveland jobbing foundry speeded up shipments of castings to war production customers, increased storage space and enabled them to organize their cleaning room more efficiently.

TIME FIGHTERS

PUT WORK IN PRODUCTION SOONER BY GIVING YOU *FASTER* CLEAN-UPS

PRODUCTS that "miss the boat" by not being cleaned on schedule never win production battles any more than triple hits that die on third base ever win a ball game. They are just "good intentions" that misfired.

The time to improve "too little and too late" conditions is NOW. If the flow of work through your cleaning room is invariably stalled; if your costs are high and cleaning quality is not what it should be, there is a pleasant surprise in store for you the first time you have a demonstration of the Wheelabrator on your work.

You will see that it is startlingly fast; that it produces a thorough, brilliantly cleaned job; and by simple computation you will prove to your own satisfaction that it will save money in many ways.

Whatever your cleaning problem may be bring it to AMERICAN—world's largest builders of airless abrasive blasting equipment. Our engineers have an unusually wide experience to draw from, because Wheelabrators are used in nearly 2000 plants on practically every conceivable cleaning application.

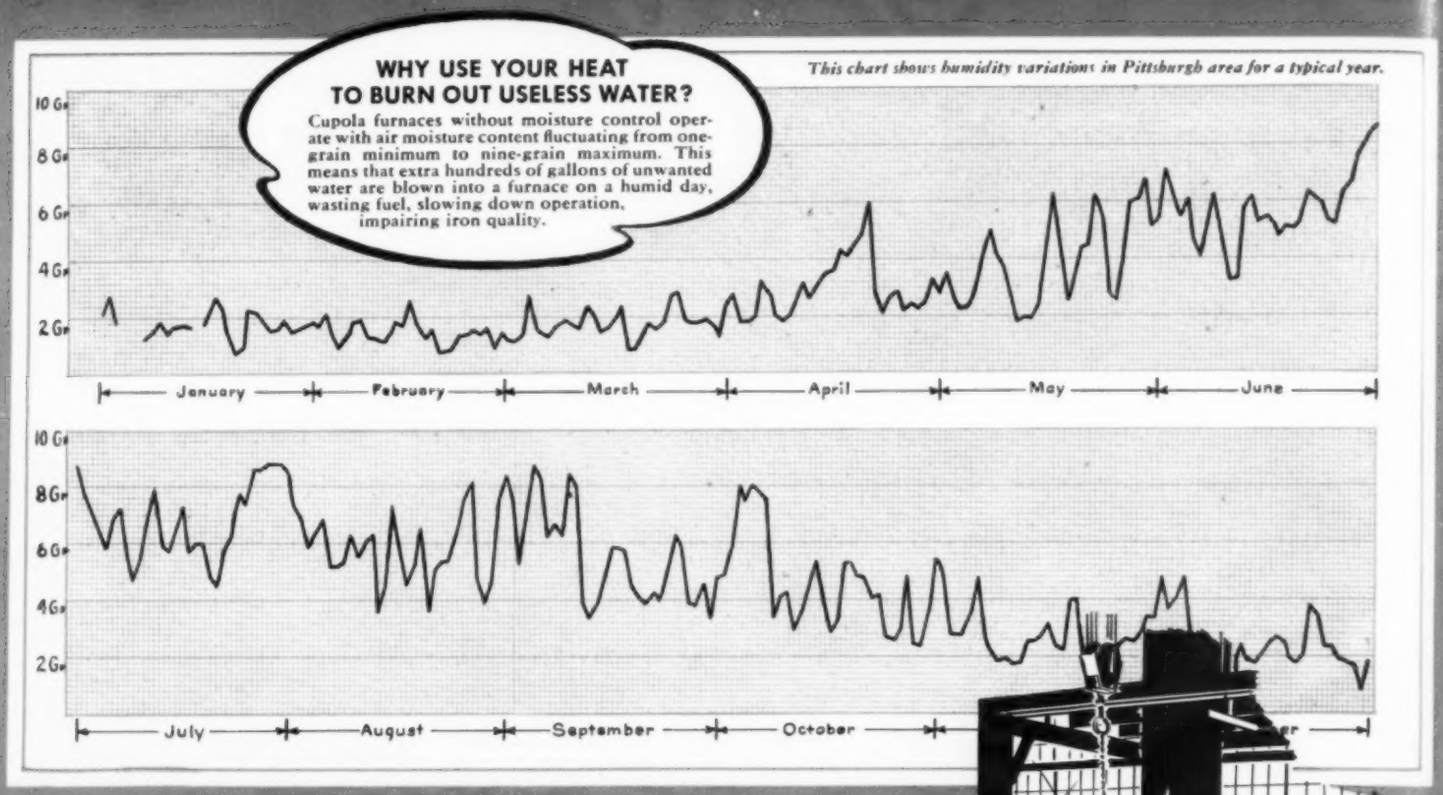
WHEELABRATOR ADVANTAGES

1. High-speed cleaning
2. Low cleaning cost
3. Reduces horsepower
4. Conserves space
5. Reduces breakage
6. Speeds up machining and grinding
7. Lengthens tool life
8. Simplifies inspection
9. Improves appearance
10. Provides perfect bond for final finishing
11. Insures accurate hardness tests

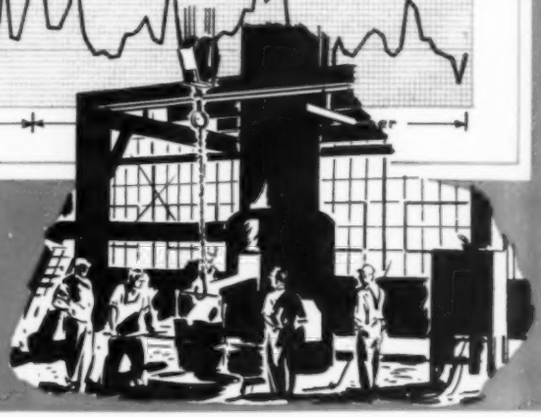
TRADE MARK
THE AMERICAN MOLDER
REG. U. S. PAT. OFF.

AMERICAN
FOUNDRY EQUIPMENT CO.
Blast Cleaning and Dust Control Engineers

505 SOUTH BYRKIT STREET • MISHAWAKA, INDIANA


WHY USE YOUR HEAT
TO BURN OUT USELESS WATER?
Cupola furnaces without moisture control operate with air moisture content fluctuating from one-grain minimum to nine-grain maximum. This means that extra hundreds of gallons of unwanted water are blown into a furnace on a humid day, wasting fuel, slowing down operation, impairing iron quality.
This chart shows humidity variations in Pittsburgh area for a typical year.
10 Gr
8 Gr
6 Gr
4 Gr
2 Gr
January
February
March
April
May
June
10 Gr
8 Gr
6 Gr
4 Gr
2 Gr
July
August
September
October

HOT TIP for 194X..



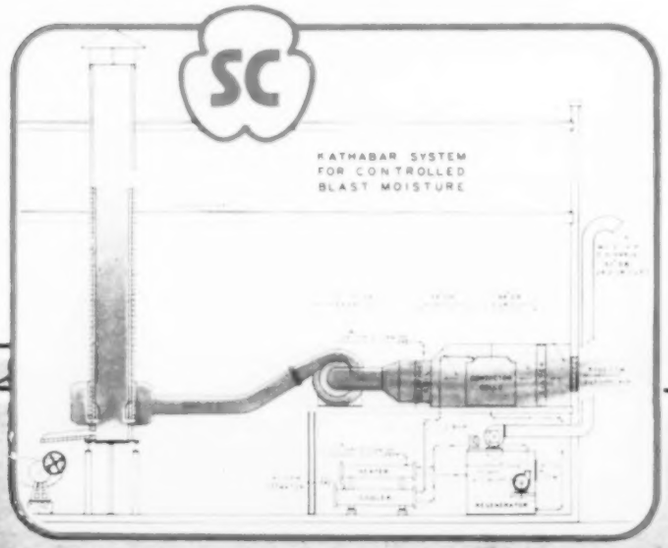
After the war, on what basis will you expect to get your share of the business? Will it be by cheapening your product to meet lower prices—or by improving quality?

For the foundryman who has an eye to his tough post-war competition, here's a smart tip:

Take this easy step now to *improve* product quality by eliminating the worst variable that goes into the cupola charge—install a Kathabar Moisture Control System. Here's what it will do for you:

1. Kathabar maintains air-moisture content in the cupola blast to 3 grains, 1 grain, or any degree you want.

2. Kathabar holds moisture content uniform and, therefor, pouring temperature uniform, every month of the year, regardless of outside temperature or humidity.



3. By eliminating variable moisture, Kathabar stabilizes production and reduces scrap losses.

4. Kathabar decreases silicon and manganese loss and controls chill.

5. Kathabar makes possible reduced coke consumption.

It is obvious that with efficient moisture control of cupola operation you can improve product quality and at the same time lower your costs. This means faster foundry output for war now and sound insurance for continued success in the post-war period.

KATHABAR *Can Be Installed NOW*

Kathabar is *not* new. Its practical value has been demonstrated on cupolas in a dozen and more leading foundries, for dry blast on blast furnaces, and for moisture control in scores of chemical, pharmaceutical and food plants where processing must be done in controlled atmospheres. Kathabar uses a minimum of critical materials. It is easily installed, simple to operate, low in cost, practically service free. Deliveries can be made in reasonably short time. Write for the free Moisture Control bulletin, giving facts and figures, describing Kathabar.

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For Cupola, Blast Furnace, and Other Industrial Processing Operations

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War Program Benefits When Workers And Management Practice Safety

AS AN important means of increasing the production of castings for the nation's war effort, foundry management must give greater attention to a program which will result in a reduction of accidents in the individual plants. With the supply of skilled foundry workers constantly becoming scarcer, due to the drafting of men for the armed services and to the stepping up of castings production, any time lost through accidents constitutes a definite loss to America's war program. Tanks, guns, trucks, shells, ships and many other machines of war use castings in such great quantities that available men and facilities cannot meet certain demands. Lost time accidents mean that these facilities, at present inadequate, cannot be operated at maximum capacity. Industrial accidents also decrease plant efficiency, and in that way influence production adversely.

Although production for war was just getting under way during 1941, that year probably saw the greatest increase in a quarter century in the output of all types of castings. An accelerated civilian demand coupled with a pyramiding of government purchases resulted in the capacity operation of practically every foundry in the United States. Under such conditions some increase could be expected in the number of accidents to foundry employes, but in the face of the great amount of educational work and attention given to safety over the past two decades, it was not anticipated that the experience of the foundry industry in 1941 would be the worst since 1926. Statistics on accident rates collected and recently published by the National Safety Council, Chicago, reveal that the foundry industry was less successful in preventing accidents when speeding-up production than was steel, machinery and other industries which also expanded rapidly during the year.

For 1941, foundry accident frequency rates averaged 21.27 reportable injuries for every million hours worked, compared with 15.39 for all industries. This represents an increase of 31 per cent over the experience of the castings industry in 1940, as compared with an increase of 17 per cent for machinery, 5 per cent for steel, 8 per cent for chemical and 8 per cent for all industries. The severity rate for the foundry industry during 1941 was 1.33 days disability for each thousand hours worked, and compares favorably with the rate of 1.53 days for all industries. The 1941 foundry severity rate represents an increase of 20 per cent over the record for 1940, and may be compared with an increase of 7 per cent in the machinery field, 3 per cent in steel, and a decrease of 50 per cent in the chemical industry and 8 per cent for all industries.

Reports accompanying these statistics indicate that accidents frequently happen to new employes and to old employes who have been shifted to other jobs with which they are not familiar. In the drive to get out production, perhaps insufficient attention has been given to the proper training of the employe in the hazards of the particular job. The fallacy of slighting the educational work in accident prevention was clearly demonstrated by the record of injuries. Safety must be sold to workers today as part of the American program for victory.

The analysis of general factors pertaining to serious accidents, as prepared by the Council, is interesting. In the main, employes were injured seriously while operating machines and in working around cranes and other hoisting equipment. The most important type of accident was getting hands and other parts of the body caught in or between moving machines and equipment. The principal unsafe practice was failure to use personal protective equipment, particularly goggles and safety shoes. The outstanding mechanical cause of accidents was unsafe working methods and processes, such as poor housekeeping and unsafe piling. The principal personal cause was disobedience of instructions, haste and other improper attitudes on the part of the workers.

Accident record of the foundry industry in the period from 1926 to 1941 is excellent, in spite of the set back during the latter year. During that period the frequency rate for manufacturing castings decreased 63 per cent and the severity rate 81 per cent, as compared with a decrease of 67 per cent in the frequency rate and 52 per cent in the severity rate for all industries. These figures prove that the safety campaign can be successful in the foundry. A renewed effort toward safety education and greater attention to good housekeeping practices should reverse the trend of the past year.

Frank G. Steinebach
Editor

Producing NONFERROUS CASTINGS Centrifugally

By HAROLD B. ZUEHLKE
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APPROACH to centrifugal casting has been with the idea of making an article cheaper in total finished cost than if had been made in a sand mold. There are cases where a centrifugal casting is the only type which will meet the requirements of the engineers and then, of course, the cost is of secondary importance.

Briefly, the centrifugal casting process requires a rapidly revolving mold, and a cover with a hole in it through which a measured quantity of molten metal is poured. The hole must be smaller than the inside diameter of the article or the metal will flush right back out. As soon as the metal has set, the machine is stopped, the cover removed, and the casting withdrawn. Then the cover is replaced, the machine started again and the entire procedure repeated for the next casting.

There is a very definite limitation to the shape of the castings which can be made, and it is not a cure all for foundry problems.

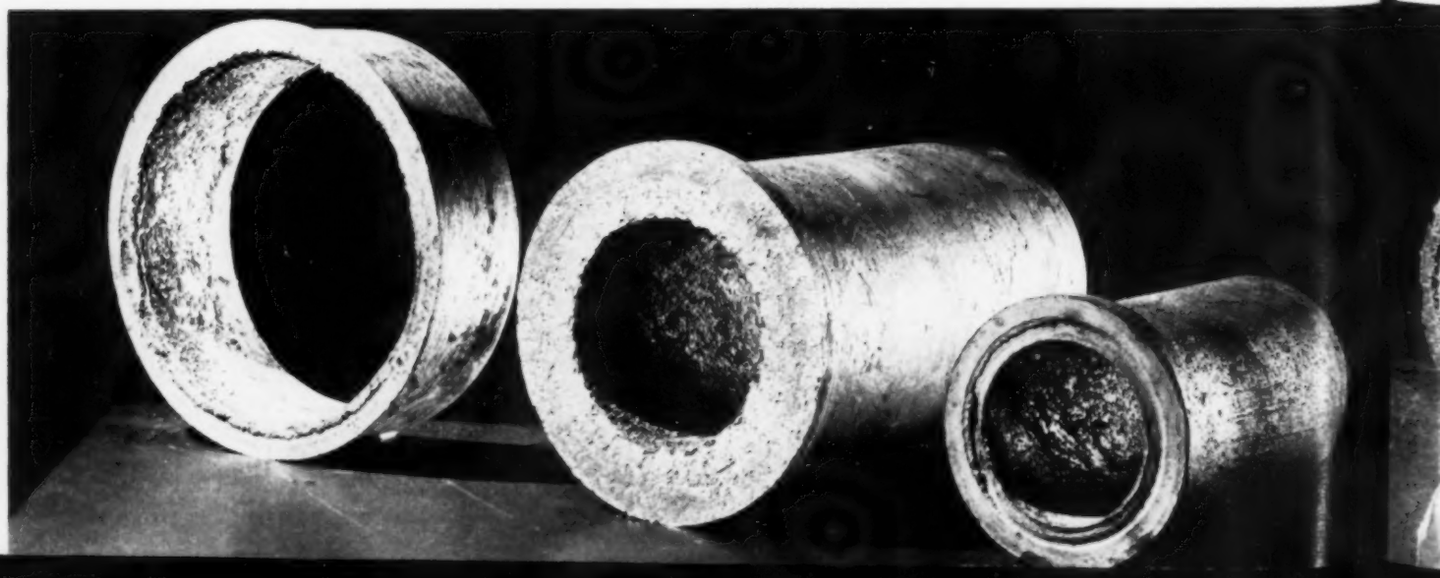
The first requirement of an article to be cast centrifugally is a straight bore completely through the approximate center. The casting must be made to the smallest bore of the article, and it becomes a question of economics whether it is worth while to machine the bore to the required size or to make the casting in the conventional way with the proper core. If the hole is not central, the entire machine will be out of balance either before or after the pour as it cannot be counterbalanced for both conditions. Unless the machine is unusually heavy and rigged for the size casting being made, dangerously high vibration will result.

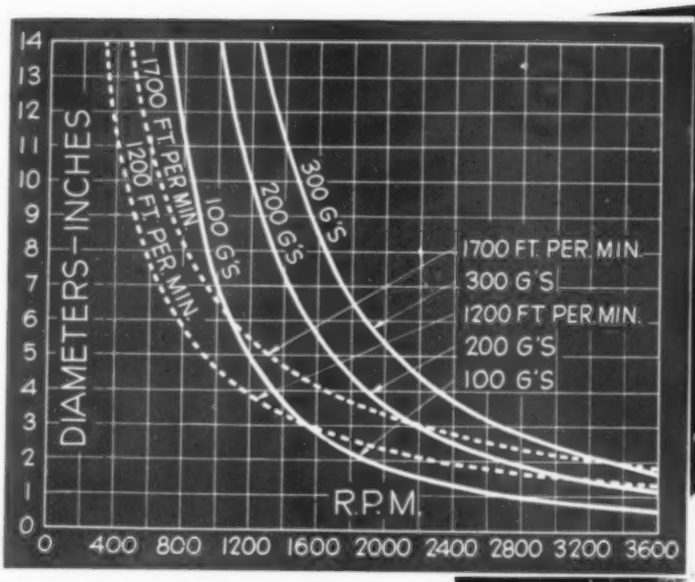
The second requirement from the standpoint of cost is that a permanent mold must be used and the casting must be of such shape, that it can be withdrawn from the mold.

Some typical cross sections are shown in Fig. 9 and with those in mind some of the advantages of centrifugal casting may be considered. First, progressive solidification from the outside of the mold with molten metal always available and under pressure for feeding. This makes a slightly denser casting than a perfect sand casting because there are smaller voids between crystals. The actual measured increase in density is 0.6 per cent.

However, there is a limit to progressive solidification, which is reached when the wall thickness of a casting gets too great in relation to the length of the casting. The exact point is reached when the rate of removal of heat

Fig. 1 (Below)—Various types of centrifugal castings. Fig. 2 (Upper right)—Centrifugal casting speed curves. Fig. 3 (Right)—Centrifugal casting machine with guard removed. Fig. 4 (Right below)—Centrifugal castings as cast. Fig. 5 (Extreme right)—Pouring an 80-pound centrifugal casting




DIAMETERS—INCHES
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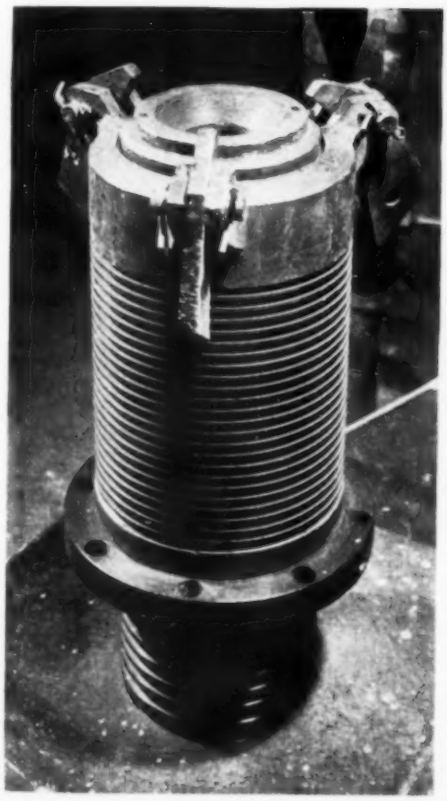
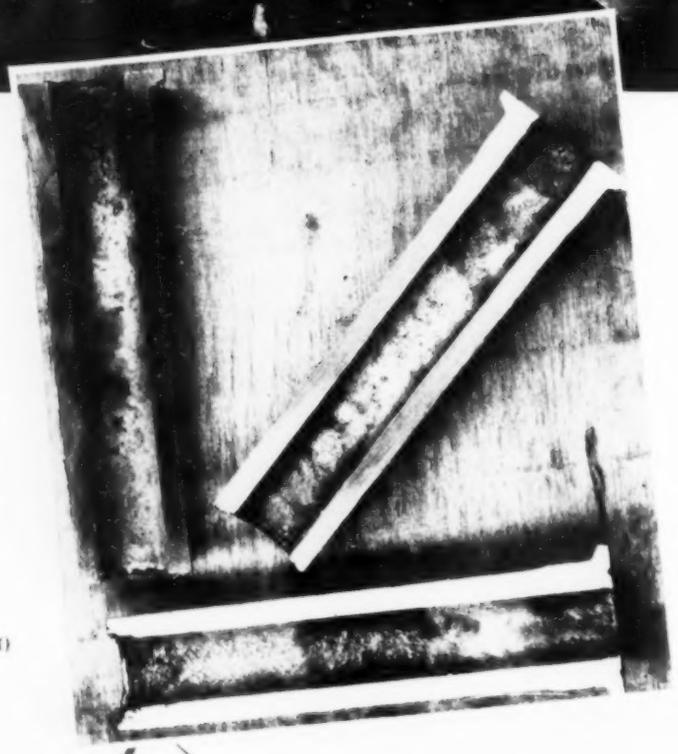
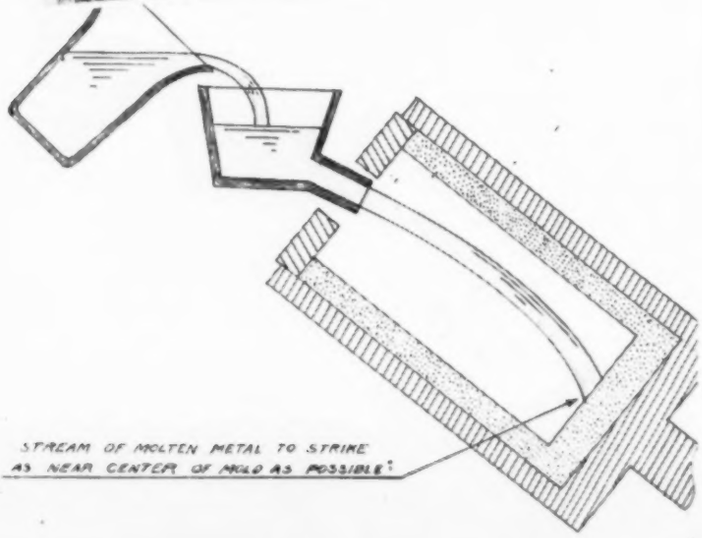






by the air inside of the casting is the same as that through the periphery of the casting which already has solidified and thence into the mold itself. If there is any considerable material still liquid at this point, solidification will proceed from two directions at once and will result in a large amount of spongy or porous metal around the bore.

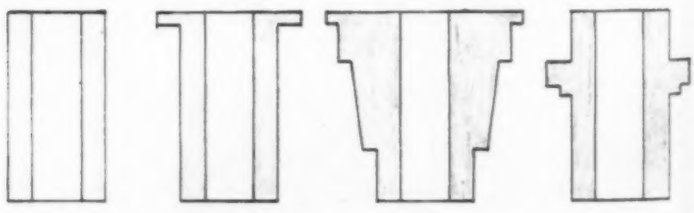
This condition can be improved somewhat by pouring the last part of the metal at an even slower rate to keep the metal in the bore just as hot as possible. That procedure will be recognized as the old foundry trick of adding fresh hot metal to a large riser when feeding is difficult. Another aid is to throw powdered charcoal into the bore as the pour has been completed. While that does not cure this problem completely, it at least reduces the amount of stock that must be left in the bore to make a sound casting.

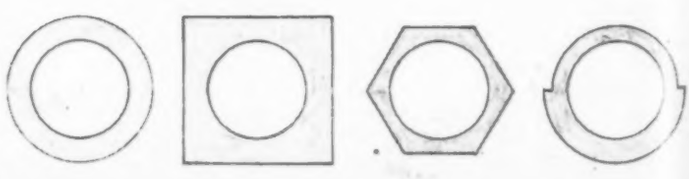
The second advantage of centrifugal casting is the cleansing or purifying action which takes place in the mold. This cleansing applies to both solids and gases, but the metal in the mold must remain molten long enough for this action to take place. If the mold is too cold, the chilling will be so rapid that the dirt and gas will be trapped in the peripheral portion of the casting before it gets a chance to work through to the bore. The solution is to have the mold hot enough to begin with and pour just as fast as possible at the start. We will go into this more fully under a discussion of pouring spouts, but we will add here that the greater the speed, the greater this cleansing action becomes.

Before leaving the subject of gases, it will be in order to point out that even when gas is trapped, the high pressure of the metal compresses the gas to a much smaller volume than it would have ordinarily. As it is usually trapped on the surface, the smaller gas pocket requires less allowance for the stock necessary for its removal.

Another advantage of centrifugal casting is its finer grain structure. Most of the (*Please turn to page* 154)

Fig. 6 (Left above)—Pouring a small centrifugal casting. Fig. 7 (Left)—Castings mounted at various pouring angles showing taper variation and distribution of dross. Fig. 8 (Left below)—Pouring spout arrangement. Fig. 9 (Right below)—Plan and elevation views of typical casting sections





Safety First—And All The Time

By WALTER PETRY
Cincinnati Milling Machine Co.,
Cincinnati, O.

WHEN balance sheets are struck at the war's conclusion, there will be no column of figures to show how many lives were lost unnecessarily, nor how many were saved by far-sighted industrialists ahead of actual requirements and building safety into the production machinery.

Some industrialists hesitate to invest in protection, thinking it is unnecessary if all men are careful. Others have not been able to modernize their plants to the fullest extent due to the rapid increase in business. Conservation of man power through safe-guarding machinery is an example of far thinking management. Step from hand operation to highly electrical controlled equipment required days, months, and even years to accomplish. It is done in a spirit of helpfulness to the human race; to lighten the burden of labor and promote safe working conditions. To maintain a higher health level of man power is in many ways as essential as guarding machinery. Once a man becomes sluggish, sleepy or barely able to stay on the job, he is a hazard to himself, to shop production, and to his country.

Dust Removed From Air

Many attempts have been made to improve working conditions by dust removal from the foundry. So long as iron is poured in molds made of sand and binders there will be some dust in the foundry. The modernly equipped foundry uses approximately one-fourth of its total electric power to free the air from dust and make health conditions approach those of the average industry. This tends to make workmen more alert and prevents many accidents that otherwise would react unfavorably against safety records.

Many things enter into the health of a workman. His home habits, recreation habits, eating habits potentially affect his alertness. If the shop in which he works is dark and dirty, these factors grow in the wrong direction and the man's health slips. If the shop is clean and bright, his mental attitude, health and alertness are improved, in addition to a favorable reflection on the home living conditions.

Technological advance in foundry practice in this production race to get them booming, get them floating and keep them flying has been an important factor. If we had listened to the arguments against technology 10 years ago, while our opponents were arming themselves with their own and all the advanced technical ideas we could give them, we would be so far behind today that capitulation would be inevitable.

Machinery Introduces Problems

Adoption of highly mechanized machinery brings more complicated problems. Unless education follows, step by step with improvements, hazards multiply and a little knowledge becomes a dangerous thing.

When electrical equipment operates with both alternating and direct current supplied through wires from two different sources, the old system of pulling the switch and hanging up a tag is not adequate protection. An electrician must know the type of equipment and realize that two electric circuits must be killed before he can work on the machine. Other complicated interlocked equipment must be fully understood before pushing a starter button. The resulting succession of starting machines might injure a nearby workman. Demand for knowledge and alertness is far greater for highly mechanized foundry equipment than for hand operated equipment. All remote control must be properly (*Please turn to page* 160)

Foundries Must Have Scrap to Meet War Demands

THIS country at last seems to be awakening to the absolute necessity of finding enormous quantities of iron and steel scrap, if foundries and steel works are to continue capacity production of war materials. Newspapers, magazines, radio and public speakers are painting the picture of a threatened crisis in the nation's war effort because of shortages of scrap metals. War Materials Inc. has been organized by the government to draw out high-cost scrap which cannot flow under present price ceilings, and the Conservation Division of the WPB is undertaking an all out scrap collection drive in which the aid of every citizen is required. Already the efforts of committees in thousands of communities has resulted in an increase in the flow of scrap.

To the foundry industry this scrap drive is vital. Unless the effort succeeds, many ferrous shops will be forced to curtail the production of war castings during the coming winter. Therefore, foundrymen should bend every effort to assist to the fullest extent in this drive. Management should undertake the following at once:

1—Organize an all-out scrap campaign in the plant. Every machine or piece of equipment, which has been idle for some time and possibly never will be used again, all worn out flasks, castings which may have been standing around for some time waiting for shipping orders which now probably will not come, and other unused metal should be collected and used.

2—Take an *active* part in the work of the local committee conducting the scrap drive.

3—Enlist the co-operation of every employe in the conduct of the community scrap drive.

4—Through your trade associations and other groups, make the scrap needs of the foundry industry felt at Washington.

If the foundry industry expects to be on the receiving end of the scrap collection drive, each foundryman must see to it that the campaign in his own community is most successful.

Enormous quantities of iron and steel scrap must be found to insure that gray iron, steel and malleable cast iron foundries are to continue capacity production of castings shown in the accompanying illustrations which are used in, or for producing war materiel. Foundrymen should and must bend every effort to make the scrap collection drive a success.'

Photos courtesy OWI

Applies Atmospheric Pressure to Secure SOUND CASTINGS

By H. F. TAYLOR and E. A. ROMINSKI
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U. S. Naval Research Laboratory
Washington

IT IS almost axiomatic that gating and risering is one of the toughest problems that the foundryman has to face. Of all the theories and practices developed in the last few years to simplify this problem, the understanding and appreciation of atmospheric pressure as it operates in the manufacture of castings may prove to be one of the most revolutionary. In the past this unseen force has been the cause of many bad castings and it is interesting that today it can be put to work in such a way as to not only make good castings but to make them more economically and more sound than ever before.

To illustrate the importance of atmospheric pressure in the foundry, it is fitting to discuss typical defects in castings and later to point out how they may be prevented by judicious application of the very medium that caused them. All foundrymen are familiar with the defect shown in the keel block casting of Fig. 14, where the cavity extends through the casting skin, but they are less familiar with the cause of the defect.

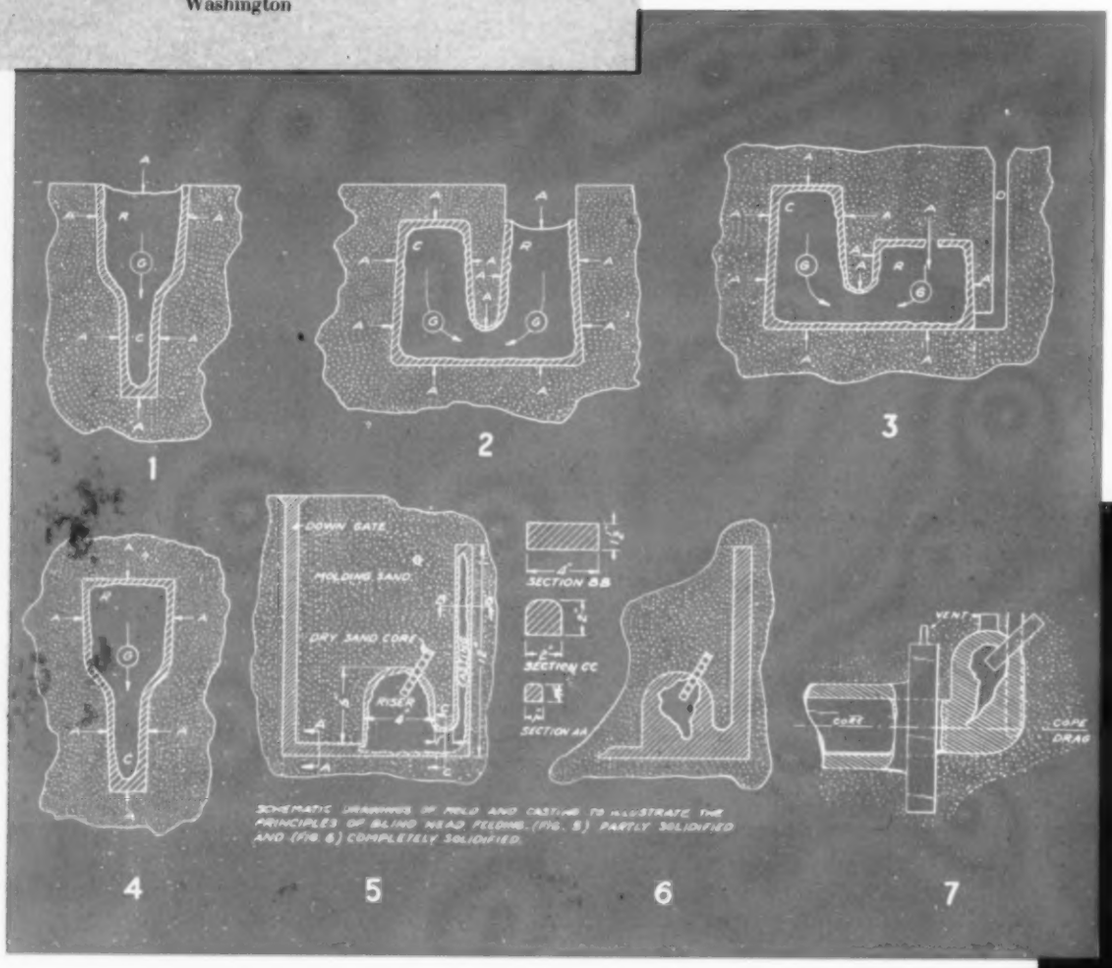


Fig. 1—Gravity and atmospheric pressure acting in the same direction. Fig. 2—Atmospheric pressure without benefit of gravity. Fig. 3—Metal head opposite to direction of feeding. Fig. 4—Casting and riser solidifying with impermeable skin. Fig. 5—Partly solidified blind head and casting. Fig. 6—Same as Fig. 5 except completely solidified. Fig. 7—Side view of valve flange made with blind riser. Fig. 8—Open riser directly above section to be fed. Fig. 9—Collapsed walls resulting from internal shrinkage and external atmospheric pressure. Fig. 10—Same as Fig. 9 except riser kept open to atmosphere. Fig. 11—Risers from stainless steel casting. Fig. 12—Identical blind risers except one was kept open to atmosphere.

It is very common at internal angles if the casting is not gated and risered properly and occurs because shrinkage is localized in the hottest section forming a partial vacuum at this point. Atmospheric pressure acts equally upon all external surfaces trying to force its way in to relieve any negative pressure which is developing inside. This air pressure amounts to approximately 15 pounds per square inch, and since internal angles are potential hot spots and the casting skin at this point is weak and plastic, it is ruptured and the partial vacuum is relieved. Because the right leg of the keel block ruptured instead of the left it has fed the left partially due to the added force of the atmosphere. In many similar types of defects it has been necessary to use a magnifying glass to find the small hole leading from the shrinkage cavity to the outside of the casting but with enough care one usually has been found Heretofore, the cause for this particular type of defect has been laid to excessive gas pressures developed from volatilization of the organic binders. However, the casting of Fig. 14 was made in dried sand bonded only with bentonite and no excessive gas pressure was developed.

Shell Is Comparatively Thin

Fig. 15, shows the comparative thinness of the solidified shell of cast metal at an internal angle. This casting, reported upon by Briggs and Gezelius, in the *Transactions* of A.F.A. Vol. 43, 1935, was bled 1 minute after pouring.

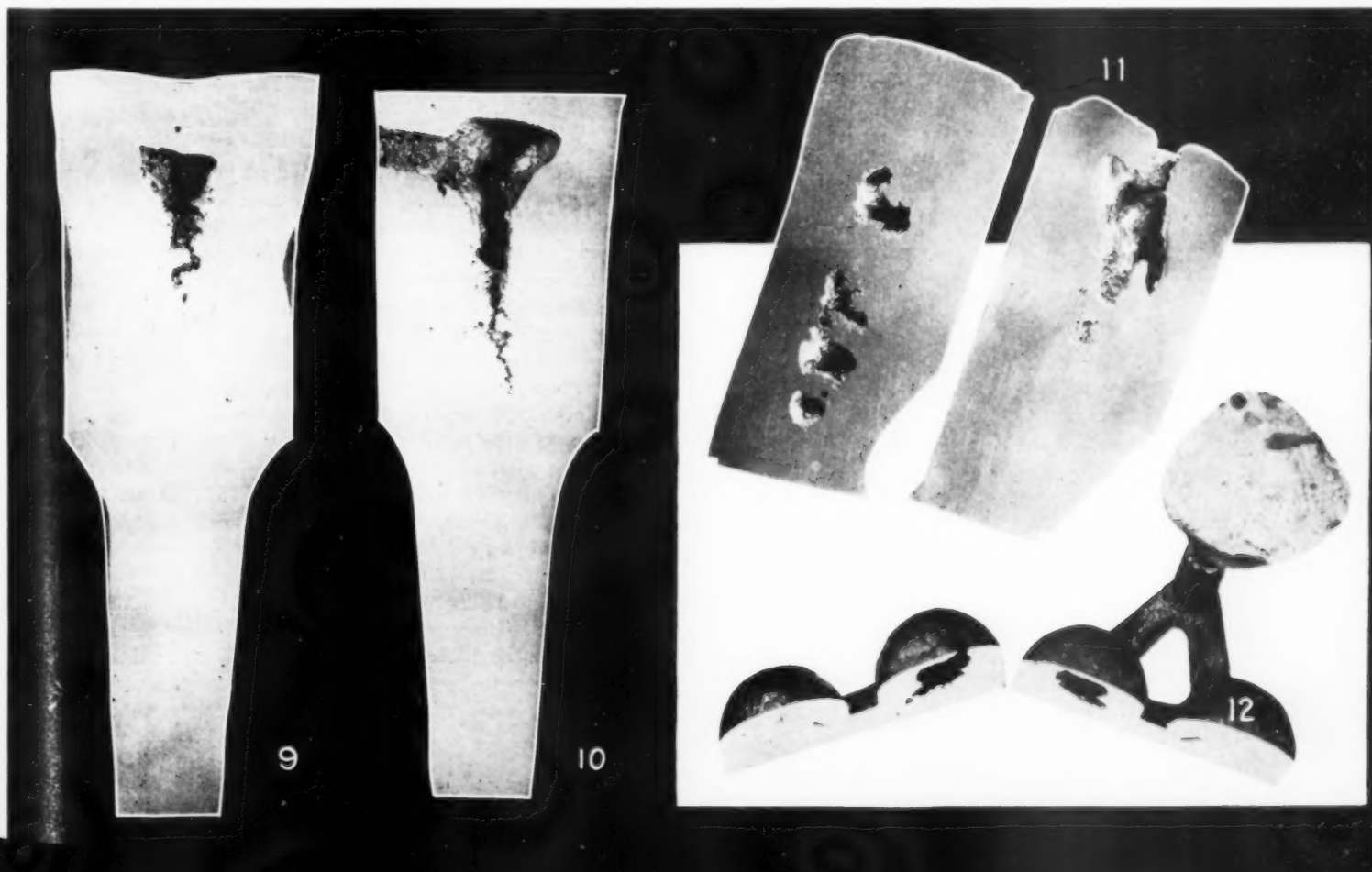
One of the most common places for this internal angle type of defect to occur is where an ingate joins a casting. A cavity is often found at that position and, too often to be a coincidence, this cavity has an opening through the outside wall of the casting. Whether it does or not depends upon the amount of shrinkage taking place and the rate at which skin strength builds up, or in other words, the severity of the hot spot. If atmospheric pressure does gain entrance, the cavity is likely to be larger than otherwise because the shrinkage is localized even more than usual.

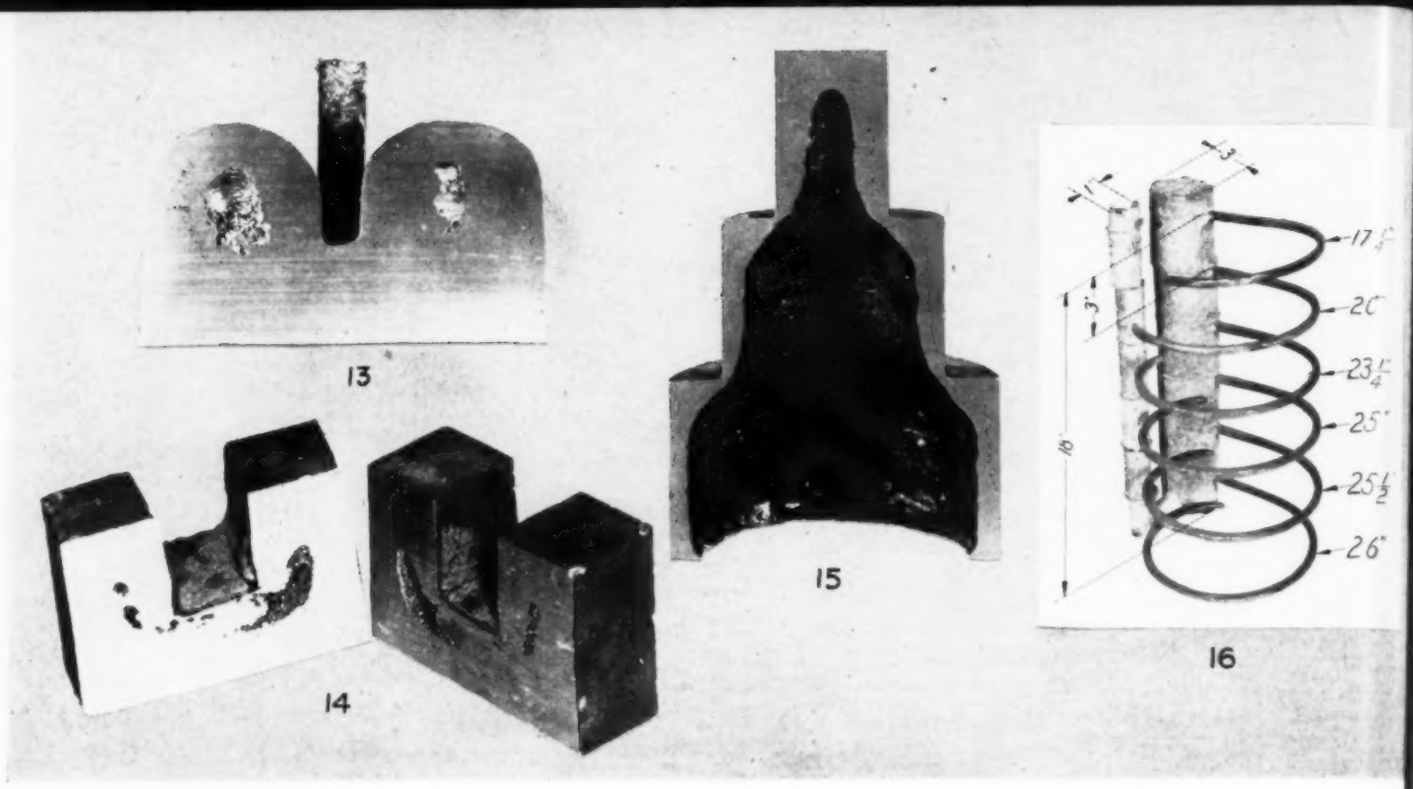
Fig. 9, discussed more fully later, is an example of the influence of atmospheric pressure. Here, because of the absence of exaggerated hot spots, the plastic walls of the riser have been forced inward by air pressure to relieve at least partially the negative pressure developing inside due to shrinkage. This casting was made with the riser covered with a cope. "Sucked in" walls on castings are not uncommon and in many cases shrinkage is compensated completely by this "external contraction" with complete elimination of any internal cavity. It is probably more simple to think of the walls being "forced in" by external pressure rather than as being "drawn in" by the vacuum. Acceptance of this simple reasoning leaves one free to grasp the full significance of being able to aid feeding by means of atmospheric pressure.

Two Forces Move the Metal

Risers are provided on castings to compensate for liquid and solidification shrinkage and the movement of liquid metal out of the riser into the casting is the result of two forces which may act either together, independently, or in opposition. The most familiar of these is the force of gravity, or liquid head. The less obvious but even more important force of atmospheric pressure is always present, tending by one means or another to prevent the formation of any degree of vacuum within the solidifying mass.

Various conditions of feeding are shown schematically in Fig. 1 to 4, inclusive. Fig. 1 illustrates the case of atmospheric pressure and gravity acting in the same direction. This is the simple case of an open riser placed directly above the section to be fed. In Fig. 2 the force





of gravity is balanced out since the casting and riser are the same height. Thus atmospheric pressure alone would be acting to force the liquid metal from the riser into the casting to feed the shrinkage and it would be essential to keep the riser open to the atmosphere at some point.

Fig. 3 is an example in which gravitational force is actually in opposition to the desired direction of metal feed since the casting is higher than the riser. The riser cannot reach to the cope surface in this case but must be buried in the mold with the pouring sprue equal to or greater in height than the casting. This is the familiar *blind riser* system. As soon as the sprue, which is relatively small, solidifies and cuts off fluid contact, the liquid head within the casting actually opposes the desired direction of feeding.

If a continuous skin is allowed to form over the riser and exclude atmospheric pressure from the liquid metal the system will work in reverse and the casting will tend to feed the riser. However, if the skin formed over the riser is kept open all the time the casting is solidifying atmospheric pressure will act, and if this force exceeds the gravitational force acting against it, feed metal will flow from the riser and prevent the formation of shrinkage cavities in the casting.

Flow Can Be Determined

In cases of opposing forces the direction of greatest force, and hence the flow of feed metal, can be determined by taking the difference between the force due to gravity and that due to atmospheric pressure. The latter can be estimated by comparing this feeding system with a simple mercury barometer in which average and atmospheric pressure will force mercury to a height of approximately 30 inches. Under similar conditions any other liquid is forced to a height which depends inversely upon its density, and for steel this amounts to a value of 52 inches. The manner of arriving at this figure was given on page 140 in the August issue of THE FOUNDRY and will not be repeated here.

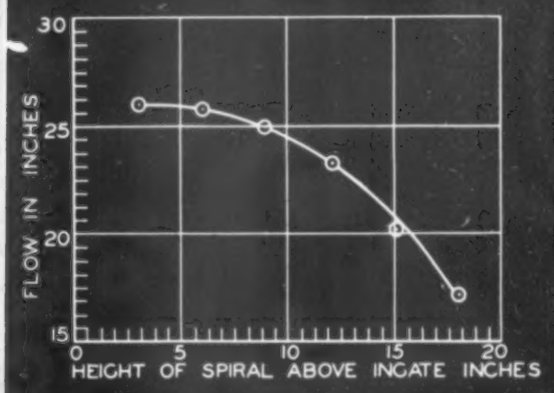
In cases where a solid wall of metal forms over the entire casting as in Fig. 4, atmospheric pressure will be withstood until shrinkage has formed a partial vacuum within the mold sufficient to provide a difference in pressure between the inside and outside of the casting which exceeds the strength of the solidified shell, when it will either collapse or puncture at its weakest point to relieve the partial vacuum. These theories have been put to practical test at the Naval Research Laboratory and some of the castings which illustrate the various cases of feeding discussed previously are shown.

Fig. 8 illustrates the usual method of heading with the riser directly above the casting. Here the forces of gravity and atmospheric pressure are additive. The top of the riser was covered with pipe eliminator to be sure that it was open to the air and to provide maximum feeding. Figs. 9 and 10 show a similar system, but in these cases the top of the riser was closed with a cope.

Atmospheric Pressure Is Needed

In Fig. 10, the riser was kept open to the atmosphere by means of a sand core but in Fig. 9 it was allowed to freeze with an impermeable skin. The differences in behavior of the two risers are readily apparent. In the case where a core was used the shrinkage cavity is larger and the sidewalls have not collapsed. In Fig. 9, however, part of the shrinkage has been compensated externally, the walls are shrunk in and the cavity is smaller. In the one, atmospheric pressure inside and outside of the riser was equalized because the permeability of the sand core is high enough to allow air and gases ready passage. In fact the permeability of the entire mold is adequate to permit this. It is extremely important to understand that atmospheric pressure acts readily through any permeable sand mold and even a very minimum of sand permeability is still adequate. There is no tendency in this case for the walls to be forced inward since no difference in pressure exists. However, in the riser without the core, a solid skin forms over the entire surface, and since there are no hot spots the walls collapse rather than puncture.

Fig. 11 shows two open risers from the same casting



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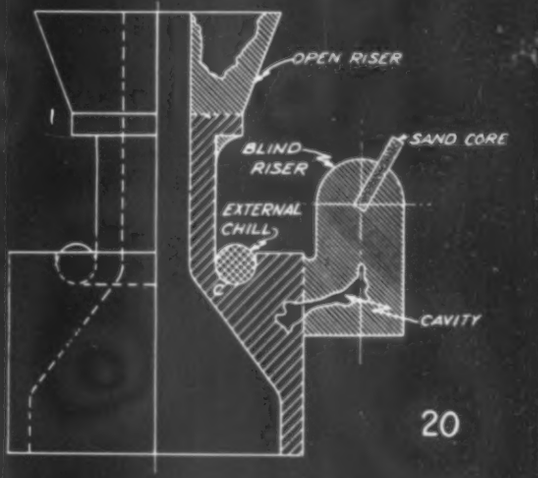

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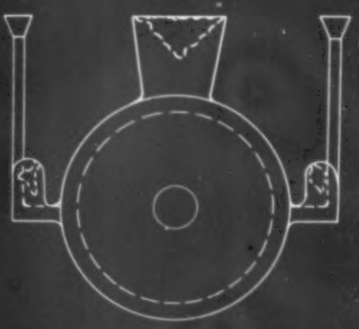

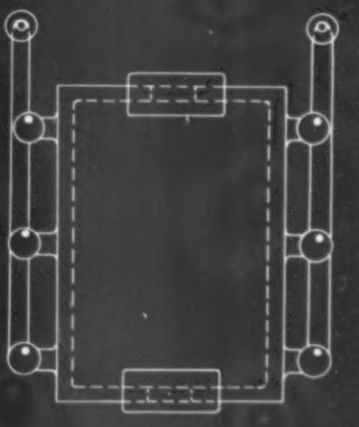

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Fig. 13—Casting and riser are identical and not open to atmosphere. Fig. 14—Atmospheric pressure breaking through solidified wall of hot spot. Fig. 15—Relative rates of skin formation at internal and external angles. Fig. 16—Temperature distribution resulting from bottom gating shown in spiral casting. Fig. 17—Ring casting made with blind riser. Fig. 18—Pressure tight housing. Fig. 19—Curve showing temperature distribution of casting in Fig. 16. Fig. 20—Illustrating necessity for individual zones of feeding for each riser. Fig. 21—Small blind risers prevent shrinkage cavities in front of ingates

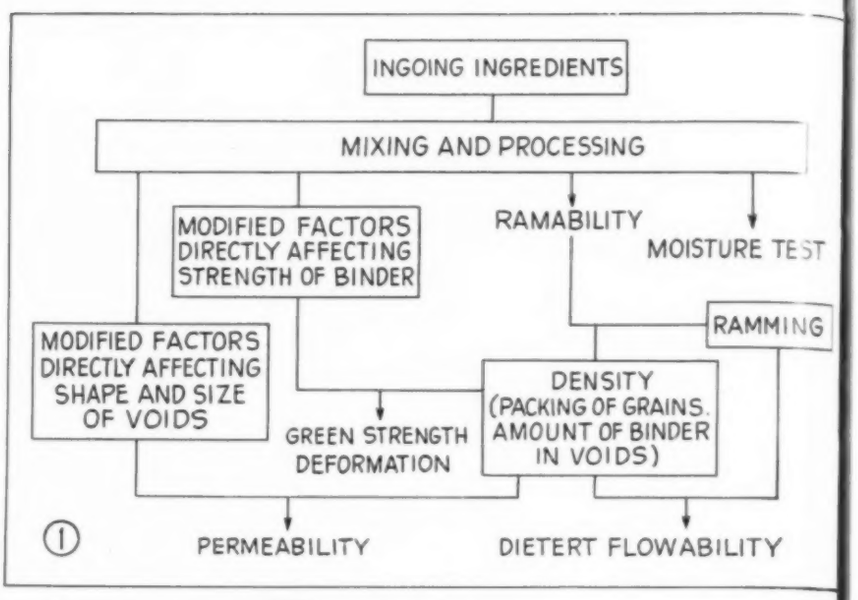
of 18-8 stainless steel. One was kept open to the atmosphere by sticking a small core into it after the mold had been filled. This was only held about one-half minute because stainless steel readily freezes over and holds the core in place. Feeding has been much more efficient in this riser than in the one which was allowed to freeze over and exclude atmospheric pressure, and the secondary piping present in the latter is prevented. One of the big advantages of antipiping compounds is that they keep risers from bridging over. This same effect can also be accomplished by the means described previously and there is no possibility of carburizing the metal. However, the compounds have an insulating effect which decreases heat loss due to radiation. This is accomplished to a certain extent by blind risers since there is no surface exposed to the air currents and radiation is lessened. Some types of antipiping compound are exothermic and actually add heat to the riser, in which case efficiency is increased.

System Balances Out Gravity Effect

A casting-riser system which balances out the effect of gravity is shown in Fig. 12. Both casting and riser are completely encased in sand because it was easier to form a continuous skin this way, than it would be with open risers. The section containing the shrinkage will be referred to as the riser and the solid section as the casting. Here the riser was kept open by a core but otherwise the casting and riser were identical. Thermal gradients were initially the same in each and in spite of this fact and that there is no aid from gravity, atmospheric pressure alone has been able to accomplish very nearly perfect feeding of the casting. By making the riser only 1-inch larger in diameter, as was done in a later casting, perfect feeding resulted. The neck between the casting and riser was approximately 2 x 2 inches in cross section and 1 inch long. Fig. 13 is a similar system in which neither casting nor riser was kept open.

Since discovery of a means for keeping blind risers open to the atmosphere has popularized their use, and since (*Please turn to page* 161)

RAMABILITY, FLOWABILITY AND DENSITY of Foundry Sands



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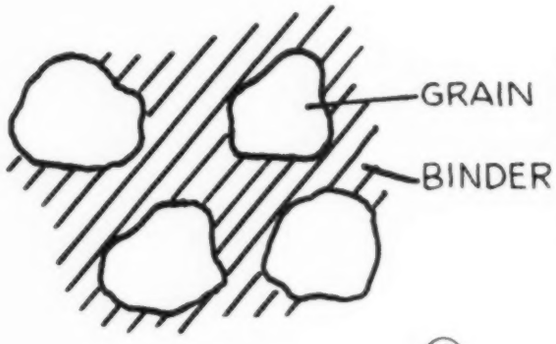
THIS investigation is a continuation of earlier work presented under the title "Some Fundamental Aspects of Foundry Sands", by E. J. Ash and E. O. Lissell, in THE FOUNDRY, July and August, 1941, dealing with the density of the standard sand specimen adopted by the American Foundrymen's Association.

It was stated that the density of the A.F.A. specimen was determined by several primary factors such as shape, size, distribution, surface condition of the sand grains, and the water present. The investigation, however, was limited to pure sand-water mixtures without any binders. This investigation takes in one more factor, namely, the type and amount of binder.

Round silica (Ottawa) sand and sharp silica (crushed



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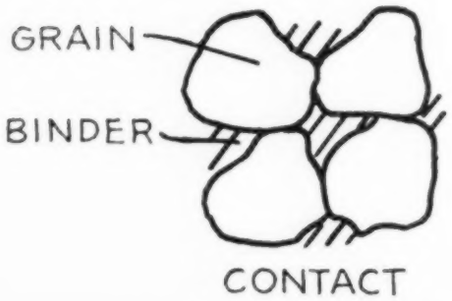
IMBEDDED GRAIN STRUCTURE



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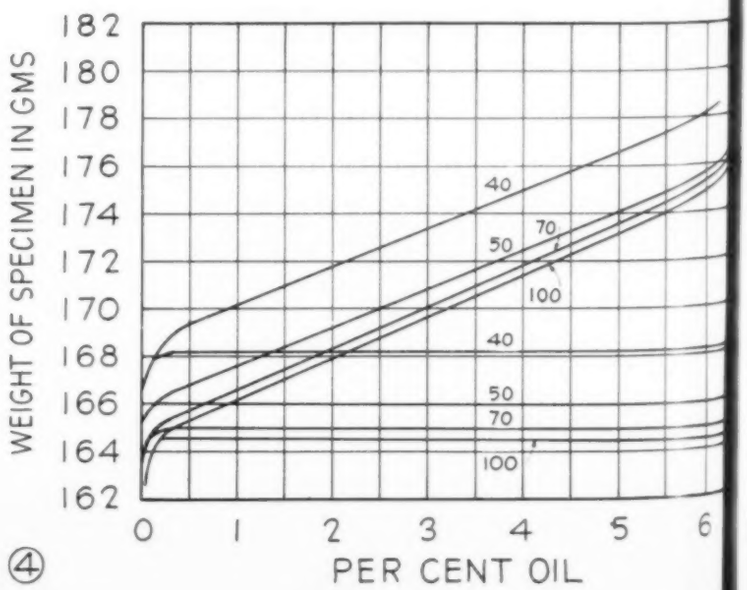
CONTACT GRAIN STRUCTURE

Fig. 1—Sand testing flow sheet. Fig. 2—Sketch of imbedded grain structure. Fig. 3—Sketch showing contact grain structure. Fig. 4—Effect of linseed oil on green and dry weight of standard specimen of round silica sand of various meshes. Fig. 5—Standard specimens of unhomogeneous structure due to incomplete compression. Fig. 6—Effect of linseed oil on green permeability of round silica sand of various sizes. Fig. 7—Green weight of standard specimens. Fig. 8—Green permeability of standard specimens. Fig. 9—Green and dry weight of specimens as a function of moisture content



④

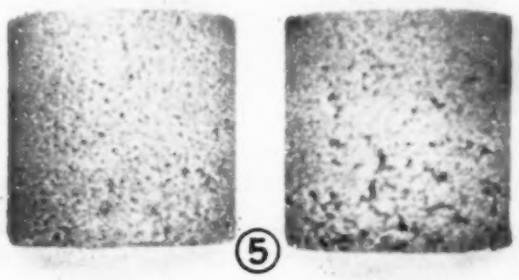
By ERIK O. LISSELL
and
EUGENE J. ASH
Department of Metal Processing
University of Michigan
Ann Arbor, Mich.

Ohio) sand were used as in the previous investigation. Most of the experiments were carried out on sand of uniform size. The separation was made on a Tyler standard sieve set. Sand retained on screen No. 50 was considered most representative for this type of investigation.

To get as complete a picture as possible, binders of several types were tested. The montmorillonitic clays were represented by Western bentonite, and the kaolinitic by fire clay. The fire clay was freed from sand by washing in water, sedimentation, drying, crushing, and sieving through a 270-mesh sieve. Sand mixtures also were made with cereal binders. Experiments were finally carried out on oil-sand mixtures with pure linseed oil and linseed oil diluted with kerosene and water.

It has to be pointed out that the sands were not mulled. Even the clay-bonded sands were mixed in a "wing mixer." The clay- and cereal-bonded sands were mixed 2½ minutes, and oil-bonded ½ minute. Test specimens were rammed to a height of 2 inches, ±0.005 inch, on an A.F.A. standard rammer as described in the previous article.

Dietert's minute moisture teller was used for determination of the moisture content in the clay- and cereal-bonded sands. Linseed oil, kerosene, and water were weighed and added to the (*Please turn to page* 151)



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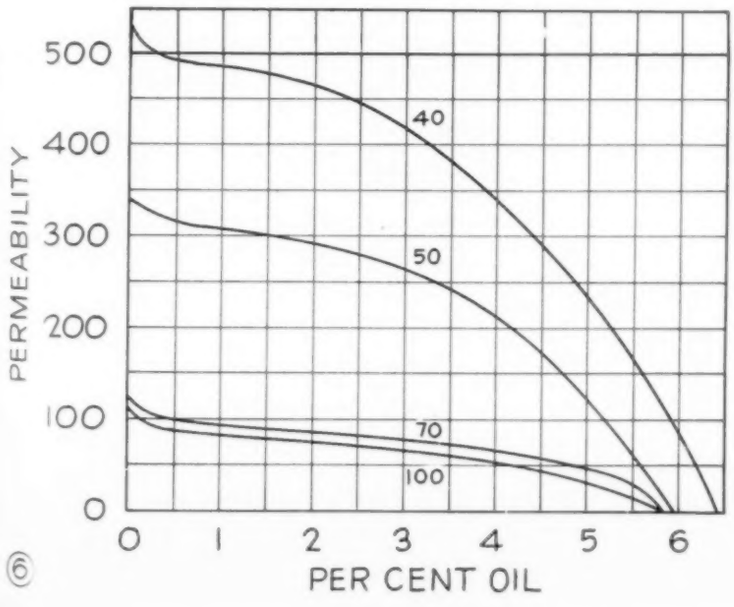

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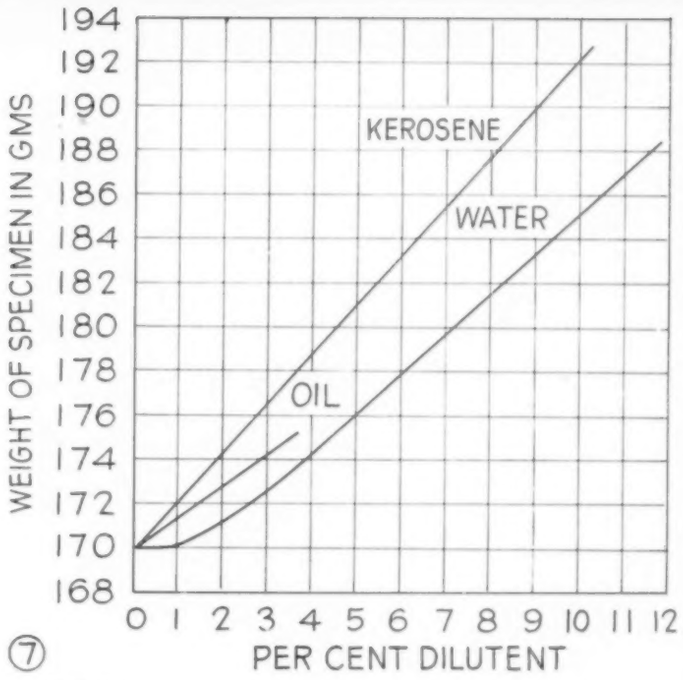

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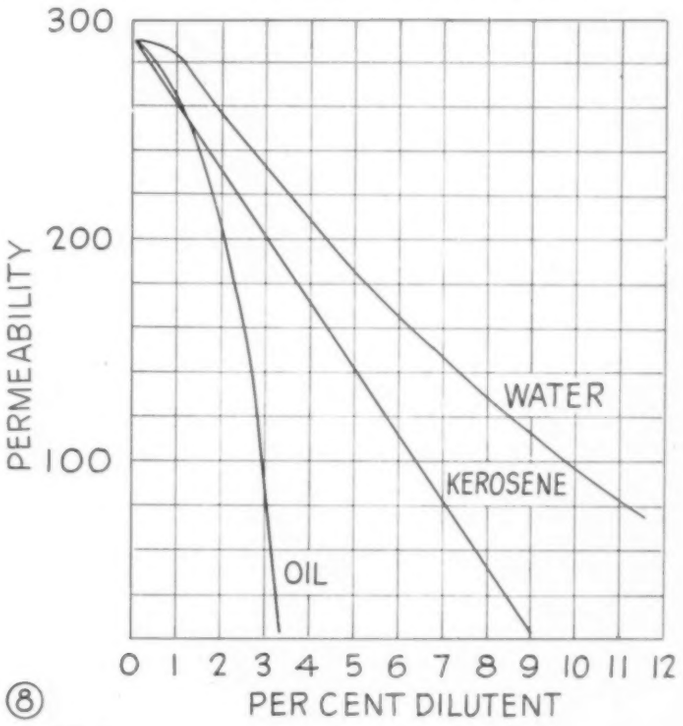

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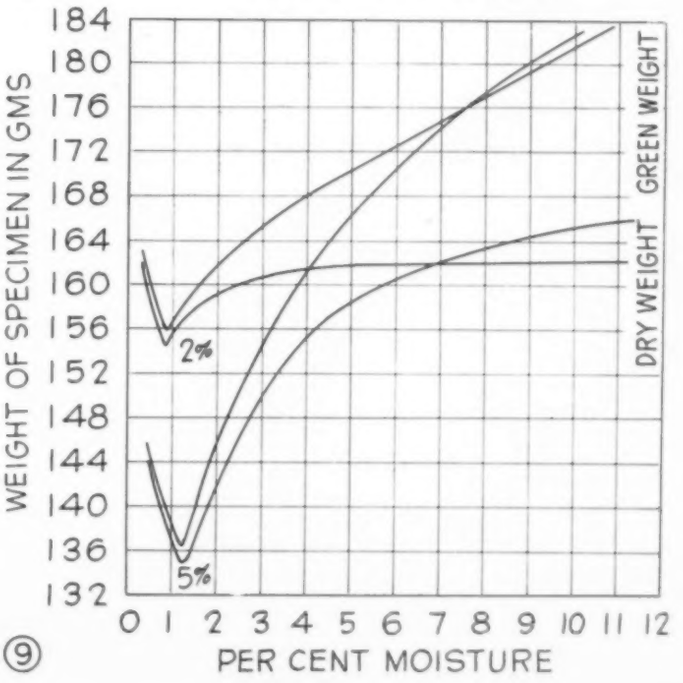

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Deep Finned AIRPLANE CYLINDER HEADS Made on Production Line

BY EDWIN BREMER

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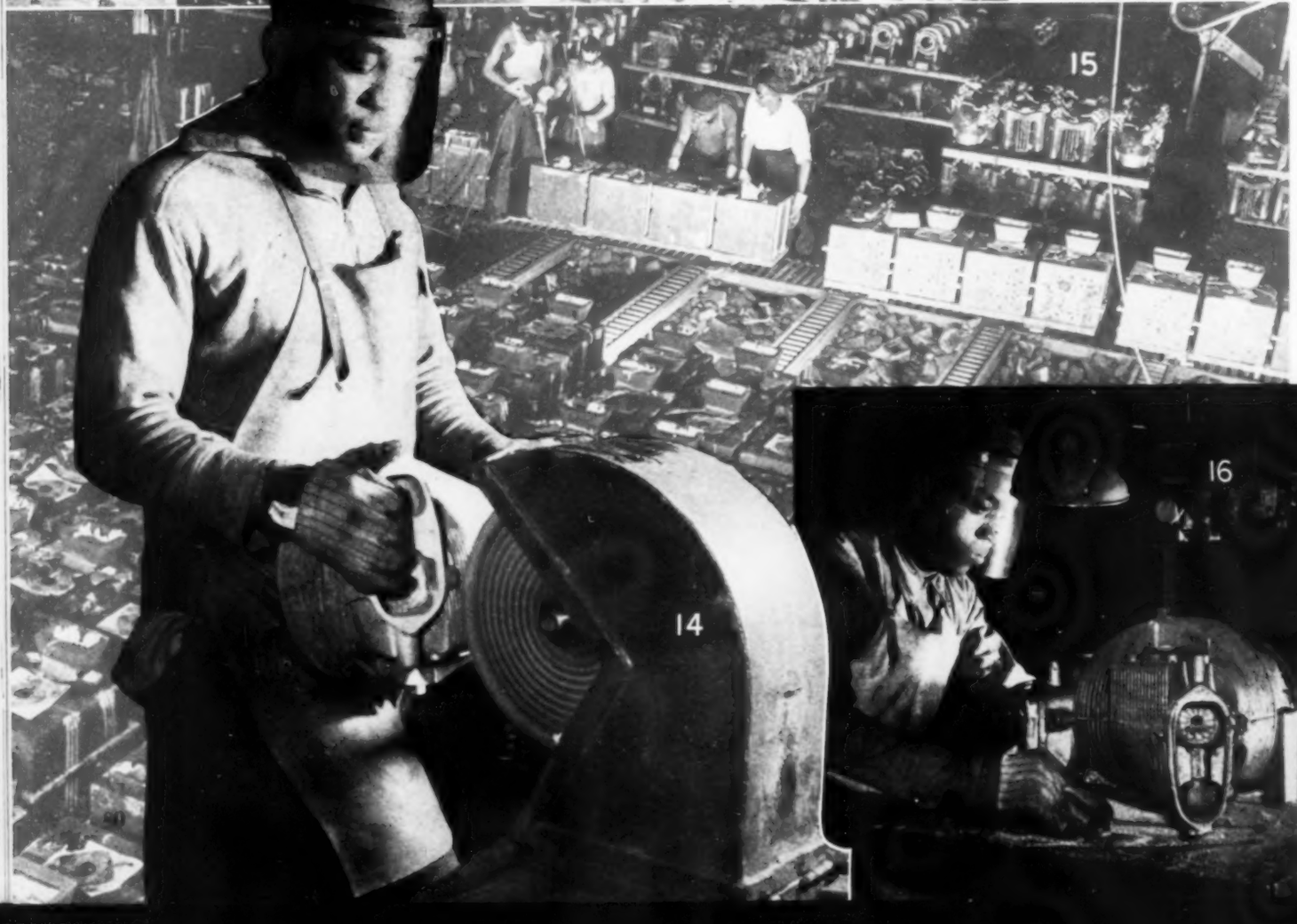

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VARIOUS steps in molding aluminum alloy airplane cylinder heads at a Midwest plant were described and melting procedure and pouring procedures were discussed in the previous issue of THE FOUNDRY. After pouring, molds are pushed from the pouring station down a roller conveyor runway, as shown in Figs. 13 and 15, where they are allowed to cool. At the end of the runway the molds are placed on a cross conveyor, which may be seen in Fig. 15, on which the castings are removed from the molds.

Knocking out the castings is accomplished with pneumatically operated chisels and crowbars, as depicted in Fig. 18. Castings are placed on the floor adjacent to the conveyor and the fins and excess metal around the rocker boxes knocked off with hand hammers. An air hammer is used on the gates and rocker arms to loosen the remaining sand in the interior and on the exterior of the casting. At the same time any wires and chills in the rocker boxes are removed. Those chills are placed in boxes for further use.

Band Saws Remove Gates

Rough cleaned castings are set on benches for the first inspection. On completion of that operation they are moved by truck to band saws where the gates and risers are removed, as shown in Fig. 16. Gates and risers constitute about 45 per cent of the poured weight of the castings, and after removal are put in cars and transported on an overhead tramrail system to the reclaiming department for remelting into ingot. Castings are placed on tiered boards holding 25 to 100 in a lot and trucked to the snagging department for removal of ragged edges on rocker boxes and port holes. Snagging is performed on double stand grinders, and the wheels used are 46 grit.

From the snagging department the cylinder heads are trucked to a table type abrasive blast machine for external and internal cleaning. Six castings are placed on the table and about 1 minute is required for the castings to pass through the cleaning chamber. Castings are turned three times to different positions as indicated in Fig. 22, to insure the abrasive reaching all parts. Abrasive used is No. 60 steel grit.

From the abrasive blasting machines the castings are sent to the chipping department for removal of excess metal which could not be ground off in the snagging operation. Following chipping the castings are forwarded to the pickling department for alkali and acid treatment. Stainless steel baskets, 19 x 30 x 42 inches, and holding 9 castings are employed. Castings first are dipped into a caustic soda bath for a period of 1 to 2 minutes and rinsed in cold water. Then they are dipped in a 36 per cent nitric acid bath, removed to a hot water rinse, piled on boards and moved to the second inspection department.

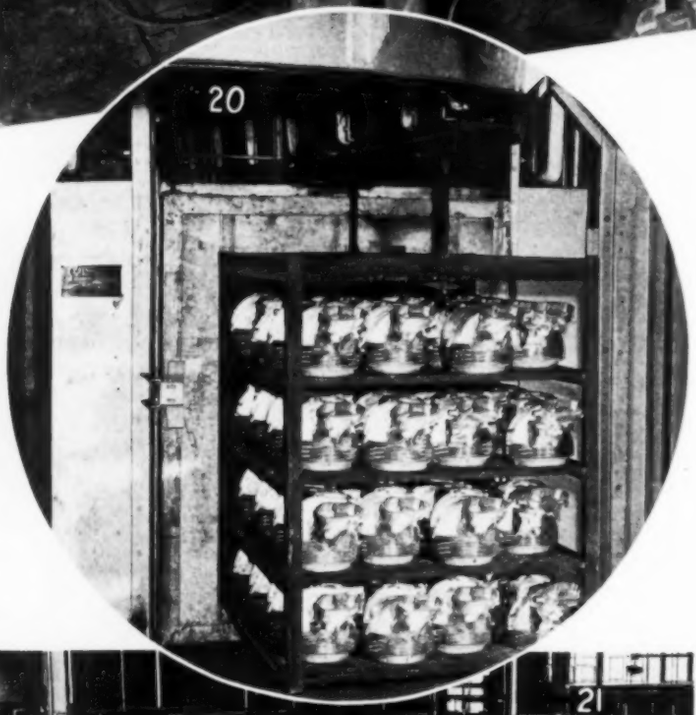
Castings Are Water Tested

Following inspection the cylinder heads are subjected to a water test under 60 pounds per square inch pressure. Next operation is seam grinding which consists of removing the parting line metal between the fins. That is accomplished with thin abrasive wheels 12 x $\frac{1}{8}$ x 1 inch mounted on a special machine designed by Wright Aeronautical Corp. engineers. The machine is similar to an abrasive cut-off machine with a sliding jig in which the casting is clamped and stops which permit the wheel to descend to a definite depth between the fins.

After seam grinding the castings are forwarded to the burring benches, shown in Figs. 17, 19 and 21, where surfaces of the fins, rocker boxes, port holes, etc., are finished to obtain the desired smoothness. Burring is performed with rotary pneumatic tools, and fitted with rotary files. Fig. 19 shows general views of the burring benches while Fig. 17 is a close up of the burring operation.

Then the burred castings are forwarded to the polishing department where the periphery of the fins and the exterior surface rocker boxes are polished or buffed on built-up polishing wheels, as shown in Fig. 14. The

Fig. 13—Cooling station for molds. Melting furnaces are in the right background, and the pouring station in the enclosure at the left background. Fig. 14—Periphery of the fins is buffed or polished on abrasive wheels to give a smooth surface. Fig. 15—After pouring the molds are allowed to cool on the conveyors shown in the foreground, and then are moved to the cross conveyor in the background where they are shaken out. Fig. 16—Gates and risers on the castings are cut off with a band saw. Fig. 17—Close-up view of the burring operation which removes fins and other rough spots. Fig. 18—Breaking out or shaking out cylinder head from the mold



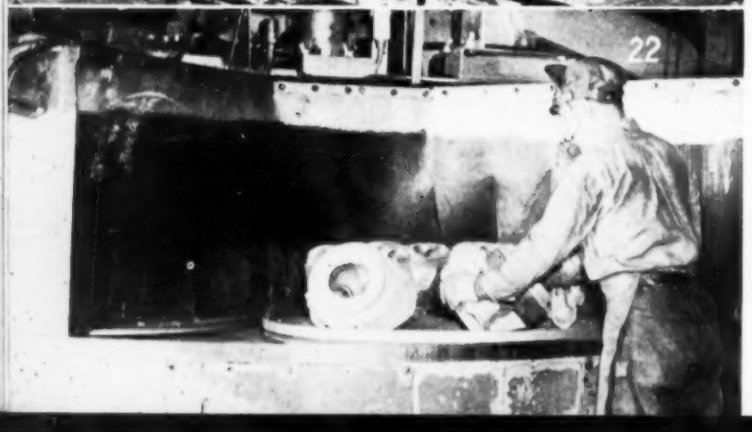


Fig. 19— Burring with rotary files removes all flash or fins and rough spots on exterior and interior of casting. Fig. 20—After thorough cleaning and pickling, the heads are heat treated. Fig. 21—Cylinder heads being cleaned at the burring benches. Fig. 22—Blast cleaning the heads inside and out. Fig. 23—Tapping reclaimed aluminum alloy from the refining furnace

wheels are made of muslin disks glued together to form a wheel about 2 inches thick. Face of the wheels is coated with hot glue. The wheels then are rolled with pressure in a pan of No. 46 abrasive grain which adheres to the glue surface. After drying for 84 hours the wheels are ready for use.

When the castings have been polished they are ready for a heat treatment which consists of two steps. The first is a solution treatment and this is followed by a precipitation treatment. Before describing those it will be recalled that previously mention was made of casting test bars with each lot of 12 cylinder heads poured from a furnace. The bars are made in sets of three poured from a common runner, and accompany their specific lots of castings through the heat treating cycle. Then the bars are subjected to the desired physical determinations.

Both heat treatments are performed in an electrically heated and operated, semicontinuous type furnace. Castings are carried through the furnace on racks suspended from an overhead conveyor as shown in Fig. 20. Each rack holds 63 castings with the necessary sets of test bars. The furnace is divided into a number of zones in which the temperature can be controlled independently, but at present only two temperatures are employed. Temperature for the solution treatment is 950 degrees Fahr., and the total time for the cycle is about 10 hours from entrance of the castings into the furnace.

At the end of that time the castings are removed from the furnace and allowed to cool in the air for two hours. They are returned to another (*Please turn to page* 165)

Properties of Sand-Cast LOW TIN ALLOYS

By F. HUDSON

EMERGENCY specifications for certain low-tin content gunmetals and cast brasses will shortly be introduced, with the view of conserving virgin metal supplies, particularly as regards tin, and to enable full use to be made of available supplies of gunmetal and brass scrap. It is hoped that engineers and founders will substitute these new specifications wherever possible for the higher tin content bronzes and gunmetals widely favored in the past. In order to effect such a changeover intelligently and with discrimination, it is essential to have a comparison of properties and production data available, and it is hoped that the following condensed review will serve a useful purpose in this direction.

Before commenting on the properties of the alloys covered by the emergency specifications, it will be appreciated that it is not possible to entirely eliminate the higher tin content alloys from engineering applications. For certain special purposes their use appears to be essential. For example, it has been shown[1] that in unlined bearings subject to pounding, such as employed for railway wagon bearings and rudder bushes, etc., on ships, the resistance to deformation is markedly reduced as the tin content falls below 10 per cent and with the introduction of lead.

It is interesting to note that the presence of up to 4 per cent zinc has in most instances but little effect upon frictional properties and resistance to deformation.[2] The use of gunmetal or bronze containing around 10 per cent tin is also considered essential for the production of high-pressure air and hydraulic valves operating at 1000 to 4000 pounds per square inch. Alloys containing up to as much as 12.5 per cent tin have been unnecessarily specified for those latter applications in the past, the higher tin content making the production of sound castings more difficult in the foundry.

On the other hand, for many purposes gunmetal of the 88-10-2 type is being wastefully employed, and service

Table I

Creep Data

Material	Approx. temp. permitting creep of 1% in 10,000 hrs. at 11.1 tons per sq. in. Degrees Cent.	1% in 10,000 hrs. at 1,000 lbs. per sq. in. Degrees Cent.	Range
Cast red brass (5.63% Sn; 6.26% Zn; 2.71% Pb; balance Cu)	204	427	223
Cast bronze (11.98% Sn; 1.36% Zn; 0.16% Pb; balance Cu)	232	399	167

Table II

Creep Properties

Material	Temperature Deg. Cent.	Temperature Deg. Fahr.	Stress (tons per square inch) to produce a creep rate of 0.01 per cent per 1000 hours	Stress (tons per square inch) to produce a creep rate of 0.1 per cent per 1000 hours
88-10-2 gunmetal	205	400	5.0	7.0
	260	500	2.7	4.0
	315	600	1.3	2.0
90-6-2-2 gunmetal	205	400	4.0	6.0
	260	500	2.7	4.0
	315	600	1.4	1.8

Table III

Alloy Compositions

	Admiralty Gunmetal A.S.T.M. Spec. B.60	Bronze A.S.T.M. Spec. B.61
Copper per cent	87.6	87.14
Tin per cent	10.18	6.22
Zinc per cent	2.2	4.61
Lead per cent	Nil	1.83
Phosphorus per cent	Trace	Trace
Maximum strength, tons per sq. in.	21.9	16.9
Elongation, per cent	35.4	34.3

Table IV

Maximum Allowable Working Stresses

Material	For metal temperatures not exceeding degrees Fahr. Sub zero	70 to 100.	150.	250.	350.	400.	450.	500.	550.
	Pounds per square inch								
86-7-5-2	6,800	6,800	6,800	6,300	5,800	5,400	5,000	4,200	3,300
85-5-5-5	5,500	5,500	5,500	5,000	4,500	3,500	.	.	.

Table V

Mechanical Properties of Low Tin Gunmetals and Cast Brasses

Properties	Gunmetal 88-10-2 Sn 9.5-10.5%; Zn 1.5-2.5% Pb 0.5% max.; Ni 1.00% max. Imp. 0.15% max.; Cu balance	Gunmetal 88-8-4 Sn 7.5-8.5%; Zn 3.5-4.5% Pb 0.50% max., Ni 1.00% max. Imp. 0.15% max., Cu balance	Gunmetal 86-7-5-2 Sn 6.0-8.0%; Zn 4.0-6.0% Pb 1.0-3.0%; Ni 1.00% max. Imp. 0.50% max., Cu balance	Gunmetal 85-5-5-5 Sn 4.0-6.0%; Zn 4.0-6.0% Pb 4.0-6.0%; Ni 1.00% max. Imp. 0.50% max.; Cu balance	Cast brass Type "A" Sn 2.00% max.; Zn balance Pb 1.0-4.0%; Ni 1.00% max. Fe 0.75% max.; Al 0.01% max. Imp. 0.50% max.; Cu 70.0-80.0%	Cast brass Type "B" Sn 2.00% max.; Zn balance Pb 1.0-4.0%; Ni 1.00% max. Fe 0.75% max.; Al 0.25% max. Imp. 0.50% max.; Cu 62.0-70.0%
Y.P. (tons per sq. in.)	8—10	8—10	7—9	6—8	4—6	5—7
M.S. (tons per sq. in.)	16—20	16—20	14—18	12—16	11—15	14—18
Elong., % on 2 in.	10—30	10—30	12—30	15—35	20—40	15—35
Izod (ft.-lbs.)	7—17	7—17	7—17	6—12	10—20	—
Brinell hardness	65—80	65—80	60—70	55—65	40—60	45—65
Diamond pyramid* hardness	70—100	70—100	70—80	60—70	—	—
Compressive strength (tons per sq. in., 0.001-in. def.)	6—8	5—8	5—6	4—5	3—4	3½—4½
Modulus of elasticity (lbs. by 10^6)	12—14	12—14	12—14	11—13	11—14	12—14

* Diamond hardness readings on cast material are likely to be variable and this method is therefore not recommended for control purposes.

conditions can be equally well met by the use of lower tin content alloys, or even by cast brass. The subsequent comparison of properties has been specifically compiled to offer guidance in this direction.

Part I—Low Tin Content Gunmetals

88 per cent copper, 8 per cent tin, 4 per cent zinc

86 per cent copper, 7 per cent tin, 5 per cent zinc, 2 per cent lead

85 per cent copper, 5 per cent tin, 5 per cent zinc, 5 per cent lead

Table Compares Mechanical Properties

Mechanical Properties (Room and Elevated Temperature)—Table V shows a comparison of mechanical properties at room temperature of the three gunmetals under consideration against admiralty gunmetal. Table VII gives the mechanical properties principally based on short-time tensile tests, at elevated temperature. Considerable work has been done by Spring[2] of the Crane Co., U.S.A., on cast materials for high temperature service, which shows that, while short-time tensile tests indicate that higher tin content alloys of the 86-12-2 and 88-10-2 types are stronger than 86-7-5-2 gunmetal at elevated temperature, the latter alloy is actually more creep resistant than the former at temperatures above 250 degrees Cent. (482 degrees Fahr.). Spring gives the figures shown in Table I for creep resistance considered from the approximate limiting temperature standpoint.

W. C. Stewart[4] publishes the figures on creep properties shown in Table II.

It is interesting to note that the decreased tin and increased lead contents do not appear to affect creep properties appreciably. Further creep tests have been carried out on admiralty gunmetal and 86-7-5-2 gunmetal by Bolton.[5] The alloys tested had the composition and room temperature properties indicated in Table III.

Creep tests were carried out on the above alloys at temperatures of 260 degrees Cent., (500 degrees Fahr.), 288 degrees Cent., (550 degrees Fahr.) and 315 degrees Cent., (599 degrees Fahr.) after being held in the creep test for periods ranging from 700 to 1700 hours. The specimens were also tested in tension at room temperature to determine whether long exposure at the temperature of creep testing had produced embrittlement. It was found that the 86-7-5-2 gunmetal was well suited for use up to 288 degrees Cent. (550 degrees Fahr.), but not for higher temperatures. Its limiting creep strength, based on the stress to produce a rate of flow less than 0.1 per cent in 10,000 hours (0.24×10^{-5} inches per inch per day) after the first 500 hours of creep test and running up to 2100 hours' duration, is about 3.57 tons per square inch at 260 degrees Cent. (500 degrees Fahr.), and a design stress of 2.23 tons per square inch is recommended at this temperature. At 260 degrees Cent. (500 degrees Fahr.), the load-carrying ability of admiralty gunmetal was lower than that of 86-7-5-2, and there was definite evidence of embrittlement. Bolton recommends that admiralty gunmetal should not be used above 232 degrees Cent. (450 degrees Fahr.), and suggests a design stress of 2.23 tons per square inch at that temperature.

Maximum Allowable Working Stresses

Quite recently, the American Society of Mechanical Engineers[6] have indicated maximum allowable working stresses for 86-7-5-2 and 85-5-5-5 gunmetal in their Rules for Construction of Unfired Pressure Vessels, Table IV.

Table VI

Sub-zero Data

Temp. Deg. Cent.	Tons per sq. in. Yield point	Tons per sq. in. Maximum strength	Elong. per cent on 2 in.	R.A. per cent
20	8.3	17.9	31.3	36.7
-180	13.6	20.2	15.3	24.6

Table VIII

Physical Properties of Low Tin Gunmetals and Cast Brasses

Properties		Gunmetals 88-10-2	Gunmetals 88-8-4	Gunmetals 86-7-5-2	Gunmetals 85-5-5-5	Cast brass Type A.	Cast brass Type B.
Specific gravity		8.6—8.8	8.6—8.8	8.6—8.8	8.6—8.8	8.45—8.55	8.4—8.5
Weight per cub. in. (lb.)		0.314	0.314	0.314	0.314	0.30	0.30
Coefficient of expansion	20—100 deg. C.	17.5	17.7	17.8		17.9	19.4
	20—200 deg. C.	17.6	17.9	18.1		18.4	20.5
	20—300 deg. C.	17.9	18.2	18.4		19.0	21.8
	20—400 deg. C.	18.0	18.4	18.7		19.6	..
	20—500 deg. C.	18.1	18.6	19.0		20.2	..
Thermal conductivity		Approx. 13—15% of copper at 20 deg. C.				Approx. 18—22% of Cu at 20 deg. C.	Approx. 16—20% of Cu at 20 deg. C.
Electrical resistivity							

Table VII

Mechanical Properties of Gunmetal at Elevated Temperature

Temperature	Per cent Sn 12.25, Zn 1.46, Pb 0.01, Fe 0.01, Cu 86.21 †				Per cent Sn 10.0, Zn 2.0, Cu 88.0 *			Per cent Sn 10.11, Zn 1.63, Pb 0.36, Cu 87.84 ‡			Per cent Sn 5.85, Zn 5.77, Pb 2.06, Cu 86.24 †			Per cent Sn 5.99, Zn 5.10, Pb 2.33, Cu 86.28 †			Per cent Sn 6.22, Zn 4.61, Pb 1.83, Cu 87.14 †					Per cent Sn 5.24, Zn 5.48, Cu 83.37 *		
Deg. F	Deg. C	Y.P.	M.S.	Elong.	Elastic limit.	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong	Charpy impact.	Creep strength.	Elastic limit.	M.S.	Elong.
70	20	8.9	18.0	15.0	11.4	15.2	8.0	8.3	15.2	14.0	7.4	17.0	36.5	7.1	15.2	20.5	7.3	17.5	31.2	20.0	6.25	7.5	14.2	21.0
200	93	..	..	..	..	..	..	..	..	..	6.7	16.6	37.5	..	..	..	6.7	16.7	27.2	..	..	..	..	..
300	150	..	..	..	9.8	16.1	8.6	..	..	..	6.4	15.8	31.0	..	..	..	6.6	16.8	28.7	..	..	5.7	11.8	18.5
400	205	..	..	..	..	..	..	7.5	15.0	18.0	6.7	15.2	28.5	..	..	..	6.3	15.9	25.5	19.5	..	..	..	..
500	260	8.2	14.4	5.5	..	..	..	5.9	11.8	11.5	5.8	13.0	24.5	..	..	..	5.8	14.6	20.5	15.2	4.0	..	..	..
555	288	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1.9	..	..	..
600	316	7.4	15.0	9.5	8.2	9.5	3.7	..	9.0	7.0	5.8	7.3	2.5	5.6	11.4	16.0	5.6	13.2	15.7	2.2	0.72	5.0	5.1	11.5
700	370	7.4	12.7	9.5	..	..	..	..	6.7	4.0	6.0	6.0	1.0	5.5	6.8	1.5	5.5	8.3	4.0	..	..	..	..	..
800	427	6.7	10.1	3.5	..	..	..	..	4.4	2.0	4.0	4.0	0	5.3	6.4	2.0	..	..	..	..	..	..	..	..
900	482	..	..	..	..	..	..	..	..	..	3.3	3.3	0	..	..	..	..	..	..	..	..	..	..	..

*Extracted from A.S.M.E.—A.S.T.M. Symposium on Effect of Temperature on the Properties of Metals, 1931.
†Extracted from Compilation of High-Temperature Creep Characteristics, A.S.M.E.—A.S.T.M., 1938.
‡Courtesy of J. Arnott (G. & J. Weir, Ltd.).

Bronze valves and fittings cast in 86-7-5-2 gunmetal can be employed up to 500 degrees Fahr., while if made in 85-5-5-5 material, the maximum temperature for use is limited to 400 degrees Fahr.

Mechanical Properties (Sub-Zero Temperatures)—Castings show a curious difference in behavior from wrought materials at low temperature, for while the strength is increased along similar lines to that which occurs in wrought materials, the ductility is always slightly less than that indicated at room temperature. S'rauss[7] gives the data in Table VI in connection with 88-8-4 gunmetal.

It can be assumed that changes of similar magnitude will occur in regard to the other gunmetals under review. The alteration in properties with decreasing temperature may be generalized as follows: There is an *increase* in yield point, tensile strength, hardness, endurance limit, modulus of elasticity, and compressive strength, and a *decrease* in elongation, reduction of area, and impact resistance.

General Physical Properties—Typical values for such properties as specific gravity, coefficient of expansion, thermal conductivity, etc., are given in Table VIII. So far as the gunmetals are concerned, there is little difference in general physical properties between 88-10-2 and other types under review.

Corrosion Data—The increased lead and zinc contents within the range of compositions covered do not appear to have much effect on the corrosion resistance of gunmetal by normal sea and fresh water. Laboratory tests show 88-10-2 to exhibit a loss in weight of 0.288 per cent after eight weeks' immersion in sea water. Gunmetal containing 7.0 per cent tin, 3.75 per cent zinc, 3.75 per cent lead, balance copper, showed a loss of 0.25 per cent under similar conditions. Practical observations based upon equipment, such as valves, in service tend to confirm these findings. Table X outlines further comparative corrosion tests conducted on gunmetal and bronze in fresh and sea water at 60 and 200 degrees Fahr.

It is interesting to observe that, while an increase of temperature accelerates the corrosion of gunmetal and bronze in fresh water, the effect (*Please turn to page* 167)

Table IX

Test Results

Alloy	Pouring temp. deg. Cent.	Yield point,* tons per sq. in.	Maximum strength tons per sq. in.	Elong. per cent on 2 in.	Brinell hardness No.
88-8-4	1170	9.4	19.6	37.0	78
86-7-5-2	1160	9.1	17.4	39.0	67
85-5-5-5	1160	9.0	15.2	29.0	61

*Taken by dividers.

Table X

Weight Loss

Alloy	Loss in grams per sq. mt. per 24 hours — Tap water — 60 deg. Fahr.	Tap water — 200 deg. Fahr.	Sea water — 60 deg. Fahr.	Sea water — 200 deg. Fahr.
Admiral manganese brass	0.27	0.43	1.19	2.00
Gunmetal (85-9-2½-3½)	0.14	0.28	1.23	0.75
Cast phosphor bronze	0.09	0.11	1.20	0.64
Cast 90-10 bronze	0.14	0.19	0.87	0.71

Table XI

Pouring Data

Section of casting	Pouring temperature — Type A Deg. Cent.	Type B Deg. Cent.
Light	1200-1100	1150-1050
Medium	1100-1050	1050-1000
Heavy*	1050-1000	1000- 970

*Range for test bars.

Table XII

Suggested Applications of Gunmetals and Cast Brasses

Type composition	B.S.S. No.	Suggested application.
Gunmetals.		
88-10-2	383	To be used only for special applications, *i.e.*, high-pressure hydraulic and air valves working between 1,000-4,000 lb. per sq. in., control and stop valves, steering gear telemotor cylinders. Special unlubricated bearings subjected to pounding, vibration and corrosion, *e.g.*, rudder post liners and bushes, steering gear bearings, etc.
88-8-4	...	Suitable for conditions of service intermediate between those specified for alloys of 88-10-2 and 86-7-5-2 type, *e.g.*, hydraulic valves working between 500-1000 lb. per sq. in. (Does not possess much advantage over alloy of 86-7-5-2 type so far as steam service is concerned.) Sea cocks and other valves connected direct to hull below water-line.* Pump impellers. Stern tubes.
86-7-5-2	...	Suitable for all general-purpose castings subject to medium steam pressures (above 100 lb. per sq. in. working pressure) and at temperatures not exceeding 500 deg. F. (260 deg. C.), *e.g.*, small engine control and boiler stop valves, cylinder cover bushes, neck rings, centrifugal pump casings, tail shaft liners and stern tube bushes. Hydraulic valves operating between 200-500 lb. per sq. in. pressure. Suitable for high-grade backings of lined bearings. Slip rings for electrical equipment (under 2 per cent lead if possible).
85-5-5-5	898	Suitable for general-purpose castings subject to steam up to 100 lb. per sq. in. working pressure and temperatures not exceeding 400 deg. F. (205 deg. C.) and water pressures up to 200 lb. per sq. in. working pressure, *e.g.*, screw down valves, bulkhead and deck fittings, tee-pieces, etc., handling auxiliary steam heating services to galleys, pantries and thermo-tanks. Cocks, taps and sanitary fittings handling sea water, *e.g.*, pump-type lavatory valves. Pumping, flooding and draining valves not directly connected to hull below water-line. Sluice valves to sea cocks. Fire hose connections. Centrifugal pump casings. Suitable for well-supported backings of certain lined bearings, *e.g.*, small stern tube bushes, etc.
Cast brasses		
Type A (70-80% Cu)	...	Suitable for low-pressure fittings working under mildly corrosive conditions not recommended for use at elevated temperatures or for conditions requiring exceptional wear and tear), *e.g.*, cocks, taps, pipe connections and sanitary fittings for use in fresh water at pressures up to 100 lb. per sq. in. Ventilating valves. Name plates. Lubricators. Better resistance to oils containing sulphur than gunmetal, therefore can be used with advantage for valves and fittings handling fuel oil and petrol.
Type B (62-70% Cu)	...	Non-pressure structural and ornamental castings. Pressure gauge and telegraph cases. Voice pipe fittings and connections. Funnel fittings. Hand wheels. Gear case covers. Steering wheel brackets. Porthole and skylight casings. Motor-boat deck fittings. Bearing backings where a copper alloy is required and the backing need not in itself possess bearing properties.

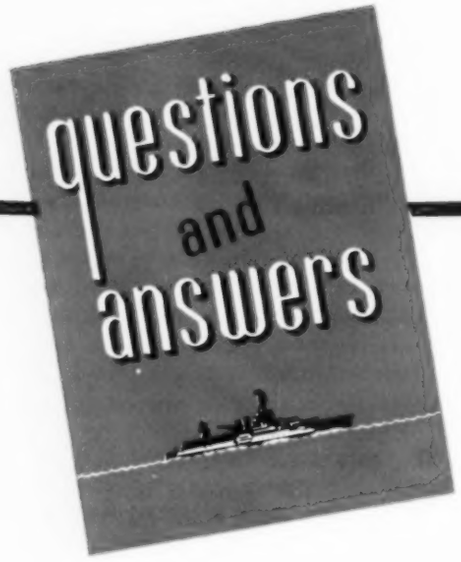
*The use of cast aluminum bronze is more suitable, as there is no galvanic action between this alloy and steel in the presence of sea water.

Table XIII

Data on Test Bars from Production Melts

Type	Composition — Cu	Sn	Pb	Fe	Al	Ni	Zn	Pouring temp. deg. Cent.	Yield point* tons per sq. in.	Max. strength tons per sq. in.	Elongation % on 2 in.	Brinell Hardness
A	72.15	0.40	4.71	0.42	nil	0.47	21.85	980	6.8	15.0	23.0	66
A	70.25	0.33	2.45	0.36	nil	0.11	26.50	960	4.8	13.2	42.0	68
B	63.64	0.27	2.80	0.19	0.03	0.10	32.97	960	5.4	16.3	39.0	63
B	63.80	1.22	2.93	0.35	nil	0.14	31.56	960	6.4	15.5	17.0	87

*Taken by dividers.



Charges Composed of All Scrap Cause Trouble in Castings

We are making gray iron castings from an all scrap charge, but have trouble with some of them. Recently one lot was too hard to drill and tap. Another lot was soft enough to be machined, but they broke in the tumbling barrel. We shall appreciate any advice on how to treat this metal in the cupola.

Certain classes of castings can be made satisfactorily from an all scrap cupola mixture, but obviously the scrap must be selected with care. No human being can melt a conglomeration of scrap iron containing everything from hay wire and plow points to stove bolts, railway spikes and burned grate bars, and expect to get good machinable gray iron castings. These materials may be used, but certain missing elements must be added to the charge to compensate for the loss.

Gray iron metallurgy is so complex and intricate that it is impossible in the brief space at our disposal to attempt any discussion. Several books are available on the subject. For the present emergency and until you have time to study the subject properly, it may be sufficient to say that hard or weak iron probably is due to insufficient amounts of silicon and manganese and too much combined carbon. With an approximate knowledge of these elements in the scrap charge, additions of silicon and manganese can be made to the charge, either in the shape of pig iron containing reasonably high amounts of these elements, or in alloy form as ferrosilicon and ferromanganese. Small briquets also are used. In the majority of instances a small addition of graphite to the metal in the ladle will affect the carbon content and soften the iron.

Molding Method Causes Porosity In Cast Iron Bushings

Some of our gray iron castings show pin holes and porosity at the top near the gate. Other castings do not show this defect. In a recent instance where valve guides and solid bushings were poured from the same ladle, the valve guides were clean and solid while the sticks 1 x 12 inches were porous all the way through.

Pin holes, porosity, shrinkage and other defects of a similar character may be traced to either the mold or the metal. In some instances where mold and metal are satisfactory, an improperly dried ladle may be responsible. Metal oxidized—or to use the foundry term—burned in the cupola leaves the tap hole impregnated to a greater or lesser extent with gas. Some of the gas may escape, but the remainder stays in the metal to appear later as cavities or blow holes in the casting. Since some of the castings are porous while others poured from the same ladle are perfect, it is apparent that your melting conditions are not reponsible for your present trouble.

Therefore, you can dismiss this factor and check on the other two, the state of the ladle and the condition of the molds. Hard or wet sand, whether in the mold or the ladle lining, will create steam in contact with molten metal. Some of this steam remains trapped in the metal and forms blow holes in the casting. The wet ladle theory is plausible, but not necessarily perfect. Metal poured from an initially boiling ladle will produce gassy castings. If the boiling persists until the ladle is empty, all the castings will be gassy.

However, in some instances the boiling action ceases after one or two castings have been poured. The remaining castings poured from that ladle will not show any porosity. In the present instance the mold is the most probable cause of the trouble. If the sticks or solid bushings are poured on end, and if several castings are grouped in the same mold, an excessive amount of steam is generated. Some of this steam is trapped in the metal. The sand is rammed harder than usual to prevent the castings from strains. The obvious remedy is to work the sand as dry as possible and to vent the sand between the castings liberally with a wire.

Need No Horn Gate in Producing Small Propeller Wheels

In our present practice we make 16-inch manganese and aluminum bronze propellers, weight 12 pounds, in a tight flask from a loose pattern. The metal is poured through a horn gate and the solid hub is carried to the top of the cope for a riser. We are considering the advisability of using a matchplate made from a proprietary material and molding the wheels in an 18-inch slip flask. We shall appreciate suggestion on method of attaching gate and riser. If we use a 1⅜-inch diameter core in a 2-inch diameter hub, is a riser necessary?

In a general way your ideas conform to modern practice in the production of small propeller castings. In one shop with which we are familiar, two accurate and highly finished metal matchplates are employed, one for the cope and one for the drag. Principal reason for this arrangement is to increase production. One man works on the cope machine while a second man makes the drags. However, your proposal to use a double face matchplate is quite feasible. Horn gates are not necessary on small wheels, thus eliminating one troublesome feature in the molding process.

A solid hub needs a high riser, but where a core is placed in the hub, the amount of shrinkage is negligible. The hub may be extended to the top of the cope as in the present practice and with the addition of a small basin, will serve satisfactorily as a sprue. The amount of metal may be reduced by using a tapered extension, instead of a hub extension the full size. Since the upper end of the core does not rest in a print, it is placed in a print about twice the usual length in the drag and the sand is pinched or tucked tightly around the print to hold the core firmly in place.

Wants Substitute for Tin in Brass Mixtures and Bronze

We would like to know if there is anything we can use to replace tin in brass mixtures and bronze. We are using 88-10-2, and the alloy must not change in shrinkage allowance, and hardness must remain the same. We have in mind using 50-50 copper-silicon in shot form, and would like to know how much of that alloy would be required to replace the tin. Do you have a list of alloys that can be used in place of tin?

So far as we know, there is nothing that can be substituted in the present copper-base alloys that will replace tin in all respects in forming alloys of the same characteristics. What will happen will be the use of other compositions through revamping of specifications and redesign of parts, so that the physical characteristics of the new compositions will be accommodated.

There have been claims that some of the silicon bronze alloys will have much the same characteristics of copper-tin bronzes. However, any substitute of copper-tin bronze must have necessarily certain characteristics that influence the serviceability of the material, either adversely or favorably, as the case may be. Corrosion resistance, thermal expansion, life of elasticity, lack of bearing value, or some other of the many characteristics necessarily will be different in one composition as compared with another. In other words, no two alloys are exactly alike.

Therefore, we can offer you little or no help at this time as to what composition to substitute for your 88-10-2 particularly since we do not know the service to which your product is subject. If these castings are to be used for bearings, there may be some composition that might work out satisfactorily, but would not necessarily be quite as good. If the alloy is being used for valves or some other type of work, then some other composition might be offered as a substitute. You cannot expect to substitute any other metal or combination of metals for the tin content in bronze and have the same characteristics as you now have in your present alloy.

Desires Pattern Metal Which Is Light with Low Shrinkage

We are interested in procuring a light, durable metal for pattern production. The metal should have the lowest possible shrinkage. We have experimented unsatisfactorily with some metals known to have a low shrinkage without very good results due principally to shrinkage in excess of our anticipation.

Demand for a low shrinkage and yet light pattern metal provides a never ending search. Many producers of castings are making some of their metal patterns from the standard No. 12 alloy containing 92 per cent aluminum and 8 per cent copper, to which is added up to 1 per cent silicon. That makes the metal very fluid, and therefore, it may be poured at low temperatures, and still retain the ability to fill out all the irregularities in the pattern design, resulting in a perfect replica of the pattern. That alloy does shrink, and consequently the master pattern must be constructed with the proper shrinkage allowances.

There is one important factor in making metal patfor any of the light alloys. An increase of shrinkage results if the pattern metal is poured at a high temperature as compared with pouring that same metal at a lower temperature. Consequently, standardization of pouring temperature is an important step in controlling shrinkage and consequently accuracy of the metal pattern in relation to the master pattern.

It should be pointed out that metal at the same temperature in two pots may result in a difference in temperature in two molds if the gating is such that the metal cools down excessively in its run to the casting cavity. That variation may be overcome by careful planning, gating, and standardization of practice. There are metals which have been used for production of metal patterns which show low shrinkage, but they are not light alloys. On the contrary, they are quite heavy and usually contain considerable tin and some bismuth. However, those metals are on the critical list, and generally are not available.

As you undoubtedly know, aluminum and its alloys also are on the critical list, but secondary aluminum may be obtained for war work by use of the proper priority schedule.

GANGWAY! By J. A. Patterson

"We didn't think you'd mind sir, we're shootin' for war stamps."

Sulphur in Copper Causes Trouble

We are trying to salvage copper wire and cable that has been damaged by fire, and find that it swells and backs up after pouring in iron chilled molds. The cable is 1-inch in diameter and made up of hundreds of hair size wires plaited together. It is badly burned and oxidized. We melt in No. 80 crucibles in oil fired furnaces, keeping it well down in the crucible, away from the flame. We would like to get the copper in a form that it may be used for production of brass and bronze.

Evidently the material you are trying to salvage contains considerable sulphur resulting when the rubber insulation was burned off the cable. While sulphur is to some extent a deoxidizing agent, it does not protect copper entirely from absorption of an excessive amount of oxygen. Consequently, when the metal is poured into a mold, either chilled or sand, the dissolved gases are ejected to some extent, resulting in the mushrooming you mention, and development of a porous structure of the metal within the mold.

Such material should be sold to a secondary smelter for recovery, since he has the necessary skill and equipment to do the job properly. However, if you want to attempt to salvage the cable, you must observe the following rules carefully and experiment to learn the many minor details that will arise. First, start the bath by melting good, sound ingot metal to provide a liquid mass in the bottom of the cricible. Small pieces of cable are pushed into the molten material from time to time, but be careful not to add much so that the metal is chilled. Add small quantities of cable as fast as it will dissolve, and still maintain the bath in a fluid state until the crucible is full. Keep the bath covered with powdered charcoal, and when the crucible is full, raise the temperature until the metal is hot and fluid.

Add to the molten bath 1 pound of 10 per cent manganese-copper to every 100 pounds of metal in the crucible. That will give 0.1 per cent manganese which will tend to clear the copper of much of the sulphur. If you find that it is insufficient, it will do no harm to increase the content by another 0.1 per cent. The final metal you pour will show little if any manganese since it will appear on the surface in the form of a scum which is skimmed off before pouring. If you are going to use the copper for manufacture of an alloy in which zinc is permissible, it will be found desirable to add some zinc to the copper in the crucible before pouring it, and thereby making it an alloy of copper and zinc rather than pure copper.

That procedure is desirable since pure copper is sensitive to oxygen and other gases, and the addition of a deoxidizing agent such as zinc will aid considerably in eliminating trouble from those sources, and enables you to obtain a sound ingot.

Need Clean Surface On Small Castings

We are finding it more and more necessary to pickle our smaller nonferrous castings since they are types which require clean surfaces. We would like to have detailed information on the following questions. 1-What is the best material for pickling vats and how should they be lined? 2-Must forced draft ventilation be used? 3-What percentage and grade of acid should be used in pickling, and what is the best operating temperature? 4-How should the castings be washed or rinsed after pickling; in hot or cold water; still or running? 5-Can you supply a sketch for a pickling department layout, or where can we obtain one?

While you mention pickling, you do not state whether you have tried or investigated other procedures for obtaining clean castings which would serve the purpose, and be less hazardous to employe health. For example, a recently developed blasting barrel using a combination of abrasive and water at high pressure is said to give excellent results on small work. In reply to your questions on pickling, the following brief notations should give you a good idea of procedure:

(1) Since nitric acid is one of the components of the pickle, the vats will of necessity be stoneware.

(2) Your state undoubtedly has laws relating to factory sanitation and protection which must be followed. Consequently, it will be advisable to consult the industrial code to determine what is required.

(3) A wide variety of solutions are employed for pickling or dipping as it more commonly is termed. Some contain 2 parts sulphuric acid to 1 part nitric acid; 2 parts nitric to 1 part sulphuric, and some straight nitric acid. Some times a little hydrochloric acid is added. However, those solutions give off considerable brown fumes of nitric oxide, and of course, adequate ventilation is required, not to mention the careful handling to prevent contact with the acids. Recently a British journal stated that a practically fumeless dip for obtaining a bright color is comprised of 65 gallons sulphuric acid, 20 gallons nitric acid, 100 pounds chromic acid, 1 gallon hydrochloric acid, and 120 gallons water.

The article also stated that the bath could be operated without need for elaborate exhaust and absorption equipment. Simple hooding without attention to great air velocity and with delivery to the open atmosphere can be used. The use of edge ventilation or exhaust will serve since the solution in use is practically fumeless.

Most of the pickling solutions are used cold to prevent excessive pitting. Where the solutions heat up too much from reaction of acids and metal, the tanks sometimes are cooled with water jackets.

(4) Washing or rinsing after pickling or dipping may be in hot water or cold water. However, our opinion is that hot water is most efficacious, and has the additional advantage that the castings dry quicker on removal with less tendency to strain. While running hot water would be ideal, we believe it would be rather costly, and hence, still tanks are used. One for the first rinse and another for the second, and the water changed when they become too acid. Or the first rinse might be in running cold water followed by a rinse in a still, hot tank.

One of the secrets of rinsing is to hold the carry-over of acid from the dipping tank or vat to a minimum, by permitting the dipped castings to drain over the dip tank for a short period before placing in the rinse tank. Length of time for dipping and draining will have to be determined by experiment. Usually only a few seconds are required for the dipping.

(5) We do not have any plans or layouts, but we believe that by consulting firms engaged in making or handling electroplating equipment and supplies, you can obtain all the information you need for installing a pickling department.

Foundry Loss Seems A Little High

The loss in our gray iron foundry is running about 5 to 6 per cent, and we believe that it is a little high. Would you advise us as to the average loss in jobbing foundries?

So far as we know there have been no figures presented recently on losses due to defective castings in jobbing foundries, but we understand that a survey made about 20 years ago indicated that it varied from 3 to 20 per cent, and in a few cases even higher. Presumably today, in a well managed foundry the loss figure you mention would be considered on the fair side. However, do not let that deter you from endeavoring to obtain still lower loss. It may be possible by checking the causes of the defects, to find ways and means to overcome them.

Help Them Win...Turn in Your SCRAP!

Scrap is steel or iron useless in its existing form but valuable as *raw material* for remelting. Since it is already refined, more scrap in the furnace charge speeds up the refining process and enables steel to be turned out faster for implements of war . . . More scrap—*from your plant*—means more steel.

Conservation Authorities Recommend the Following 8 Steps

1. Put some one individual in charge of scrap in all departments of your business and GIVE HIM AUTHORITY TO ACT.

2. Comb the plant and yards for dormant scrap, abandoned equipment, old boilers, pipe, moulds, obsolete dies and parts, material now being destroyed which has salvage value.

3. Survey all plant equipment, particularly idle standby or discarded machines, with a view to applying or converting them to useful production.

4. SEGREGATION: Identify, classify and segregate scrap and supervise its handling to avoid contamination. This will increase its value. Provide separate containers, clearly marked for each class of scrap material.

Repair or rework worn or broken cutting tools. Keep unusable small pieces and turnings segregated. Even high speed steel grinding dust is valuable.

Dismantle discarded equipment promptly into its components — electrical, fastenings, lumber, etc. — so that these parts may be utilized or scrapped.

Sort blanks, short ends, cut-downs, clippings, etc., for possible reuse for smaller parts made in the same or other departments.

Recover and reclaim used cutting oils, lubricants, surplus paints and spray finishes.

Sort sweepings and miscellaneous waste to recover scrap values.

5. Constant reminders in the form of posters, illustrations of right and wrong methods, pay envelope enclosures, house organ publicity, etc., are potent aids to the conservation program.

6. Release for scrap, obsolete engravings, electrotypes, and standing types for catalogs, forms and advertising material.

7. Inspect all refuse to detect avoidable waste and excessive rejections. Educate production executives to correct such conditions at the source.

8. For information and assistance on special phases of conservation and salvage communicate with Industrial Salvage Section, Conservation Division, War Production Board, 9th Floor, Washington Gas Light Building, Washington, D. C., or with nearest regional office.

The metallurgical experience of our technical staff is available to aid you in these and other technical phases of metal salvage.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Want Literature on Foundry Sands

Kindly supply us with a list of books or other literature on molding and core sands for ferrous and nonferrous metals.

Up to the present so far as we know, no book has been published containing full and detailed information on foundry sands for all metals. The subject is so complex and presents so many ramifications that no single book possibly could cover the field. Several books are available on certain phases of foundry sands. During the past 25 years the subject has received the attention of various committees of the American Foundrymen's Association. Committee reports and papers are incorporated in the *Transactions* of the A.F.A. and in volumes of THE FOUNDRY. The following books are available: *Foundry Sand, Its Use and Abuse*, by E. W. Smith; *Standard and Tentatively Adopted Methods of Testing and Grading Foundry Sands*, by the A.F.A.; *Modern Core Practice and Theory*, by H. W. Dietert. The various sand and clay producing companies are in position to supply highly interesting and pertinent literature. Practically every issue of THE FOUNDRY presents information on some phase of the perennial sand question.

Porous Bore Caused By Poor Feeding

We are making aluminum bronze castings from a composition containing 88 per cent copper, 8 per cent aluminum and 4 per cent iron according to Army specifications, and are having difficulty with a sort of porous condition in the small bore of the casting. That condition usually comes on the drag side, although it sometimes comes on both cope and drag. We have tried increasing the machining allowance without results. We also have tried it with and without chills on the outside with the same results. We have been working with the thought that it was an internal shrink although it appeared to us that it is a condition of the metal. We have somewhat the same trouble with manganese bronze castings, but not quite to the same degree.

The defect in the aluminum bronze casting submitted is another example of the shrinkage that occurs at points where feeding is inadequate. The fact that you experience the same difficulty with manganese bronzes indicates further that the shrinkage of that alloy is sufficient to cause some trouble, and if you had cut and fractured the castings at sections where such shrinkage is likely to occur, you would have seen clearly the shrinkage structure resulting from lack of feed.

To correct that shrinkage in aluminum bronze, it frequently is necessary to rebuild the pattern, so that it may be located in the mold in a position that feeding risers can be attached properly. In some instances, as in the present one, you might have to do away with the cored holes, casting it solid, and then attaching to that solid piece a riser of sufficient size and height to insure feeding. That of course would mean additional machining to bore out the solid metal, but it is not an uncommon experience in casting aluminum bronze.

It is well known that a long, uniformly thick bushing is a difficult casting to make in aluminum bronze since the long bushing necessarily is not fed properly at all points. The cope side of the casting is the same thickness as the drag side, and they both freeze about the same time, so that feeding is difficult.

We suggest that you study carefully the possibility of rotating the position of the pattern in the mold by coring it differently so that you can put a riser on the heavy boss, on the outside of that part of the casting which now is giving trouble. If you could attach a sufficiently heavy riser, it might be possible that it would do the feeding of the bore that now is defective. If not, you might even have to cast the piece on end, making that part of the casting that has the "similar bore" solid, and then attach a riser to that solid piece.

Skilled foundrymen invariably in making new castings, cut them up into a wide variety of shapes and sizes, and study the sections before getting into production so that the gates and risers are such that a solid casting will eventuate.

Going To Build New Brass Foundry

We propose building a brass foundry in which we shall employ eight molders and shall appreciate information of any books or other forms of literature we might consult on the subject.

We are not familiar with any book covering in detail the erection, layout and equipment of nonferrous foundries. THE FOUNDRY on many occasions has presented illustrated articles describing individual plants, large and small. Possibly a study of some of these would give you all the information you desire. A new plant does not necessarily duplicate all the details existing in another plant. In fact it is quite probable that a diligent examination of all the foundries in the country, would fail to find two exactly alike in all particulars. Local conditions usually constitute the final deciding factor. However, a man who is familiar with, or has studied buildings and methods of operation in many foundries, is in better position to plan a foundry for his particular purpose, than is a man without this particular or all-around background of knowledge.

A comprehensive series of articles by N. K. B. Patch entitled *Planning The Brass Foundry* in the December, 1941 and in the January, February, March and April, 1942 issues of THE FOUNDRY contains practically all the information required by any person contemplating the layout and erection of a new foundry, or the remodeling of an existing foundry.

Castings Show Fine Specks on Surface

Castings made from specification 46-B5 bronze ingot containing 85 to 89 per cent copper, 7.5 to 11 per cent tin, and 1.5 to 4.5 per cent zinc, appear solid when cast. On the last machine operation fine black specks show on the drag as well as the cope side. Examination of the ingot by sectioning and machining shows no indication of impurities. The casting is polished highly and engraved, and although the defects are extremely minute, the castings are not acceptable. The inclusions or specks appear to be very hard, and at times break the engraver's tools.

Since the ingot apparently is free from the defect, the trouble must arise after melting. However, it might be pointed out that examination of only one ingot is of practically no value in determining the characteristics of a heat involving several thousands of pounds.

Without a defective casting at hand for examination, it is rather difficult to make any definite pronouncement as to the exact cause of the specks. You state that they are hard and tend to break the engraver's tools. Possibly they may be minute pieces of undissolved iron or iron scale which come from using a metal skimmer on the pots. Then again they may be sand or other dirt washed into the mold, and which lodges just under the skin.

If the engraver's tools are small and fine, it is possible that they could be broken through striking discontinuities in the surface. In other words if the small specks are holes filled with cutting or polishing compound, the tool might drop into the minute depression, and not having sufficient strength, would break off.

As you undoubtedly know nonferrous alloys are quite susceptible to gas absorption, and being unable to eject all of the gas before solidification occurs, contain holes which vary in size from some hardly visible with a low power magnifying glass to those easily seen with the naked eye. Hence, it might be worth while to investigate melting conditions, and see that the metal is melted rapidly and at the proper temperature since it has a very limited pouring range.

Learn how foundries SPEED UP core rooms with

TRULINE BINDER

Reg. U. S. Pat. Off.

Many foundries are getting more cores on every shift, sometimes twice as many, by using Truline Binder. Where Truline fits in, it will cut core costs, too.

Truline bonded cores bake faster. This is important where equipment is being called on for maximum production. And in conveyor-ovens, Truline makes those big ones bake in one trip through.

Truline burns out so quickly that it reduces the time for knock-out and cleaning—frequently as much as one-half to two-thirds.

We can give you actual results from many sources to show how Truline is increasing output and lowering costs in foundries producing steel, grey iron, malleable, and non-ferrous castings.

If you want to learn how others are profiting by having Truline in the core room, clip the coupon to your letterhead and mail it today.

NAVAL STORES DEPARTMENT

HERCULES POWDER COMPANY

INCORPORATED

999 MARKET STREET • WILMINGTON, DELAWARE

Please send ☐ sample ☐ information on how to use Truline Binder in casting: .....
(state type of work and kind of metal cast)

.....

Name _____

Company _____ *Title* _____

Address _____ *City* _____ *State* _____

men of industry

WILLIAM J. MacNEILL has been elected president, Federal Malleable Co., Milwaukee, succeeding O. L. Hollister who died recently. Mr. MacNeill is a native of Wisconsin, and received his bachelor of arts degree at the University of Indiana after 2 years' military service during the World war. He then received a master of science degree in metallurgy at the University of Wisconsin in 1926. Mr. MacNeill has been connected with Federal Malleable Co. for more than 20 years, and previous to his election as president, served as secretary of the company. He has been active in the affairs of the Wisconsin Chapter of the A.F.A. and served as its president in 1939.

♦ ♦ ♦

Don J. Reese has been made chief, Manufacture and Raw Materials Unit, Metallurgical and Specifications Section, War Production Board, Washington, succeeding **Dr. G. B. Waterhouse,** who has been transferred to the Office of Lend-Lease Administration. Mr. Reese was born in Wilkes-Barre, Pa., and was graduated from the University of Michigan in 1925 with a degree of bachelor of science in chemical engineering. Over a period of years he has held positions with McCord & Co., Chicago, Wilson Foundry & Machine Co., Pontiac, Mich. and the Whiting Corp., Harvey, Ill. At present he is on leave of absence from the Research and Development Division, International Nickel Co., New York. Mr. Reese has been active in work of the American Foundrymen's Association, is past chairman of the Chicago and the Metropolitan chapters, and has written numerous technical articles.

♦ ♦ ♦

John Munro recently has been elected vice president, Whiting Corp., Harvey, Ill. His new duties as vice president in charge of procurement will include purchasing, expediting, and priorities. Mr. Munro began his business career as a clerk for the Illinois Central Railroad, and then became secretary to one of the executives of that company. He joined the Whiting Corp. in 1928 as secretary to the treasurer of that organization, and in rapid succession became credit manager, assistant treasurer, controller of the stoker division, and now vice president.

♦ ♦ ♦

Eugene L. Bunting, in November, will mark the 25th anniversary of his appointment to the position of nonferrous foundry superintendent in the plant of the Lunkenheimer Co., Cincinnati. Mr. Bunting started with that company as a laborer in 1904 and became successively a coremaker, machine molder, furnace tender, charge of furnace room and foreman. In 1917 he was made superintendent. During the past 25 years he has produced nearly 150,000,000 pounds of good bronze castings for pressure work and for industrial hard service applications. Also many million pounds of nickel alloys, monel metal and aluminum. During the present emergency period practically all castings are for ships and planes. His melting experience covers gas and oil fired open flame furnaces, crucible furnaces, the old Booth electric, Detroit electric and Ajax-Wyatt furnaces melting over 50 different alloys including tin bronzes, manganese bronzes, silicon bronzes, monel and other nickel alloys from 10 per cent to pure nickel, and a wide range of aluminum alloys.

♦ ♦ ♦

Clarence J. White has been appointed foundry foreman, Schaefer-Goodnow Foundry, Pittsburgh.

♦ ♦ ♦

Frank A. Sharpe has been made sales manager Mid-West Abrasive Co., Detroit. He joined the Mid-West company about a year ago.

♦ ♦ ♦

Dr. George B. Waterhouse, until recently associated with the War Production Board, Washington, has been transferred to the Office of Lend-Lease Administration, 515 Twenty-second street, Northwest, Washington, where he will serve as special consultant on iron and steel and other metals.

♦ ♦ ♦

Raymond Hart of New York, has been appointed administrator, Production Requirements Plan, on the staff of **A. I.**

(Continued on page 94)

William J. MacNeill

Don J. Reese

Eugene L. Bunting

John Munro

Woodward

●●●▬

Uniform PIG IRON

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

(*Continued from page* 92)

Henderson, deputy director general for industry operations. Mr. Hart will be in charge of PRP operations within the industrial and commodity branches of WPB and will maintain liaison between the branches and the office of the deputy director general for priorities control. Mr. Hart joined the War Production Board in February, 1942, as a consultant in the Bureau of Research and Statistics. Since June 1, he has been a special assistant to Mr. Henderson.

♦ ♦ ♦

Charles C. Brisbois, foundry superintendent, Robert Mitchell Co., Montreal, Que., has been elected the first chairman of the newly organized Eastern Canada-Newfoundland Chapter of the A.F.A. Immediately following graduation from L'Academie de LaSalle, Ottawa, Mr. Brisbois became a molder and later coremaker for the Ottawa Steel & Iron Castings Co. Ltd., Ottawa. After serving his apprenticeship in those fields, he turned to melting, studying the operation of all classes of furnaces and methods of melting various kinds of metals. He was assistant superintendent of the Ottawa Steel & Iron Co. when he left to join the Thomas Davidson Co. as foundry foreman in 1923. He has held his present position since 1929. Mr. Brisbois has prepared many papers on foundry practice. Best known of these possibly is the one which he prepared with A. E. Cartwright dealing with pouring of both nonferrous and alloyed iron castings through risers which was presented at the Cleveland convention of the A.F.A. in 1938. Mr. Brisbois also is a member of the American Society for Metals.

♦ ♦ ♦

Frederick G. Sefing, International Nickel Co., New York, recently was elected chairman of the Metropolitan Chapter of the A.F.A. Mr. Sefing received his degree in mechanical engineering from Lehigh University in 1919, and his master of science degree from Pennsylvania State College in 1924. After graduating from Lehigh, Mr. Sefing was connected with the metallurgy department of Hudson Motor Car Co., Detroit, and the Rockford Drop Forge Co., Rockford, Ill. He began teaching at Pennsylvania State College as an instructor in chemistry in 1921 and in 1926 he established the curriculum in industrial metallurgy and directed its instruction at Michigan State College, East Lansing, Mich. In 1937 he joined International Nickel Co., as research metallurgist at the company's laboratories in Bayonne, N. J. His present duties include establishing practice in foundries in the production of wear resistant machine tool castings. Mr. Sefing was active in the founding of the Metropolitan Chapter of the A.F.A. He is a member of the A.F.A. committee on co-operation with engineering schools and has given talks before many of the chapters on production of cast iron with superior wear and corrosion resistance.

♦ ♦ ♦

Gerald K. Buhler, for the past 5 years a member of the staff of the American Foundrymen's Association, Chicago, recently was commissioned an ensign in the United States Navy and now is stationed at Jacksonville, Fla. Mr. Buhler completed his indoctrination training at Notre Dame University, South Bend, Ind. He joined the A. F. A. staff in 1937 and was associated closely with the publication of the *American Foundryman*, the quarterly *Transactions*, and other A. F. A. publications. When the Nonferrous Founders Society was organized, he served as acting secretary until a permanent secretary had been appointed.

♦ ♦ ♦

William E. Vogt has been elected secretary, Electro Metallurgical Sales Corp., a unit of Union Carbide & Carbon Corp. His headquarters will be at the general offices of the corporation in New York. Mr. Vogt is a native of New York and has been connected with units of the corporation for more than 30 years, joining the organization as a stenographer in 1912

♦ ♦ ♦

O. F. Seidenbecker, vice president, Wisconsin Steel Works, division of International Harvester Co., Chicago, was honored by his associates Sept. 9 on the occasion of his 30 years' service with the company.

♦ ♦ ♦

Major John Slezak, on leave of absence as president, Turner Brass Works, Sycamore, Ill., head of the tank branch and acting chief of the industrial division, Chicago Ordnance District, United States Army, has been promoted to the rank of lieutenant colonel.

♦ ♦ ♦

Stephen E. Fitzgerald has been appointed director, Division of Information, War Production Board. Mr. Fitzgerald formerly was chief of the Production Branch in the OEM division of information, having joined the staff of that organization in February, 1941.

♦ ♦ ♦

R. P. Haynes, 26 Vernon avenue, Ashland, O., has been appointed representative of the Cleveland Quarries Co., Cleveland, for the sale of firestone, in the state of Illinois north of Springfield, and in Lake, Porter and LaPorte counties in Indiana.

♦ ♦ ♦

F. D. Wild, formerly vice president and treasurer, Warman Steel Casting Co. Los Angeles, has been elected president and treasurer. **William P. McGervey Jr.,** secretary, has been made vice president in charge of production, and **H. T. Adams** succeeds Mr. McGervey as secretary.

♦ ♦ ♦

R. J. Laidlaw has been appointed manager of the Cleveland district office, Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Laidlaw will succeed **A. J. Klug,** who now is devoting

(*Concluded on page* 96)

Frederick G. Sefing

Charles C. Brisbois

Gerald K. Buhler

William E. Vogt

From the nature of operations, foundry equipment naturally wears out faster than that in many other industries. Hence, under present conditions, the slogan, "Make it Last", is even more important to foundrymen than to others.

Continuous maintenance is the only means of guarding against equipment mortality. And the responsibility for continuous maintenance rests squarely on management. "Down" time cannot be depended upon for adequate maintenance today. Maintenance and production must be carried on simultaneously, which requires ingenuity and planning.

A few minutes on each shift devoted to cleaning machines and equipment, with a liberal use of compressed air to remove sand and dust from inaccessible parts, will help considerably in keeping them in good operating condition. Proper lubrication of mold conveyors, overhead conveyors and other active machinery should also be systematically carried out.

The difficulty of buying new equipment and the uncertainty of deliveries make extending the life of existing equipment a matter of first importance.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTES FOR THE CUPOLA • FERROMOLYBDENUM FOR THE LADLE

Climax Mo-lyb-den-um Company
500 Fifth Avenue • New York City

MOLY

(*Concluded from page 94*)

his entire time to special work with important industries in the Cleveland district. Mr. Laidlaw has been connected with the Worthington organization in various capacities since his return from overseas in 1919.

• • •

J. W. Biggerstaff, E. W. Bradford, J. P. Fleming, J. A. Graulty and **J. D. Reynolds** have been appointed assistant superintendents for the American Locomotive Co. plant at Schenectady, N. Y.

• • •

Maj. Gen Charles M. Wesson, United States Army retired, chief of ordnance for 4 years from June, 1938, has been appointed an assistant to the administrator, Office of Lend-Lease Administration. During the first World War, Maj. Gen. Wesson was connected with the foundry at Watertown arsenal.

• • •

John J. Walsch, formerly sand control engineer, Beardsley & Piper Co., Chicago, has become connected with the Dayton Steel Foundry Co., Dayton, O., as general superintendent of its foundry. Mr. Walsch was educated in schools at Waukesha, Wis., and served a special apprenticeship at the Smith Steel Foundry Co., Milwaukee, after which he became general foreman, Pettibone Mulliken Co., Chicago. He then served several years as superintendent, Crucible Steel Casting Co., Lansdowne, Pa., which position he resigned to become manager of the steel foundry division, Clark Equipment Co., Buchanan, Mich. He then became connected with the Beardsley & Piper Co., Chicago.

• • •

Charles A. Thompson, Pittsburgh office, Robins Conveying Belt Co., Passaic, N. J., has been appointed a lieutenant in the United States Navy. Lieutenant Thompson is a graduate of Carnegie Institute of Technology, Pittsburgh, and had considerable engineering experience before joining the Robins sales staff.

• • •

Wallace T. Montague has been elected a vice president, Norton Co., Worcester, Mass. Mr. Montague has charge of sales planning and development and has held the title of assistant vice president. He entered the Norton organization in 1912 and has been associated chiefly with research and sales.

• • •

Dr. Elmo P. Hohman, professor of the department of economics, Northwestern University, has been placed in charge of the recently opened price division office, for the Chicago metropolitan area of the Office of Price Administration. The unit will cover not only the city of Chicago proper but also the surrounding suburban area extending from the Indiana line through the western and northern suburbs up to Waukegan, Ill. The office is located at 228 North LaSalle street, Chicago.

• • •

Dr. Frederick W. Sullivan Jr., since 1940 manager of chemical research, Barrett Division, Allied Chemical & Die Corp., Edgewater, N. J., has been appointed technical director of the Institute of Gas Technology of Illinois Institute of Technology, Chicago. Prior to 1940, he was director of research, Standard Oil Co. of Indiana, Chicago.

• • •

Clint E. Starr has been made melting superintendent, Electric Furnace Department of the Ordnance Division, Cabot Shops Inc., Pampa, Tex. Mr. Starr previously has been connected with electric furnace departments of various Midwest and West Coast steel plants and foundries.

• • •

R. H. Langdon and **E. P. Gregory** have been appointed field engineers, Norton Co., Worcester, Mass. Mr. Langdon will serve the Pittsburgh district and Mr. Gregory the Chicago district. Both men have had experience in the research laboratories and the sales engineering department at Worcester.

• • •

Harold E. Koch, vice president, Heavy Duty Electric Co., Milwaukee, has been appointed president, succeeding the late Edwin L. Smalley, founder and president, who died Aug. 29. **George A. Chutter,** Eastern district manager and **Norman C. Bloye,** sales engineering department, have been appointed vice presidents.

• • •

E. L. Fay, chief inspector of the John Deere Tractor Co., Waterloo, Iowa, recently has been elected president of the Northern Iowa Foundrymen's Association. Mr. Fay was born in Buchanan county, Iowa, in 1888 and he first entered the metal industry in 1908 as a machinist's helper. In 1910 he joined the Waterloo Gas Engine Co., and worked through various branches of the machine shop, tool room, assembly, etc. In 1917 the company was purchased by Deere & Co., and became the John Deere Tractor Co. He was appointed chief inspector of that organization in 1918.

• • •

Milwaukee Chaplet & Mfg. Co., 1023 South Fortieth street, Milwaukee, is building a 25 x 125-foot brick and concrete addition to its plant to provide increased manufacturing facilities. Paul F. Rice is president and general manager.

Detroit Concern Wins Minute Man Flag

In recognition of the fact that 100 per cent of the employes are devoting 10 per cent of their pay to the purchase of war bonds, the City Pattern Works, Detroit, was presented with the bull's eye Minute Man flag by the United States Treasury Department on Aug. 21. Shown holding the flag, reading from left to right, are: Edward J. Jeffries Jr., mayor of Detroit; Commander Robert Velz, United States Navy; Vaughan Reid, president, City Pattern Works; and J. H. Krutsch and P. V. Rilett of the United States Treasury Department

The CORE OIL DOCTOR

Devoted to new ideas and case study reports on core room practice

Published Monthly, Volume 1, Number 7, October 1942

No Secrets Here

There is no secrecy connected with the manufacturing of core oil; withheld only are the special formulae used by us to manufacture standard grades of oil. The processes and equipments used to assure uniform quality are open to every one.

We invite foundrymen to visit us at any time and see for themselves how our 350,000 gallon plant is laid out and piped so that no two oils can come in contact with each other; see our modernly equipped laboratory, our six large cooking kettles and the novel layout that provides speedy production and delivery of all orders, whether they are LCL shipments, carloads or tank car lots.

An operating feature of our plant is our main Pump House installation. It is arranged so that no two oils will come in contact with each other until they are weighed for blending. Included is a large electrically controlled tank scale used to blend our oils by weight. Weighing is the only known method of counteracting the shrinkage and expansion in oil due to temperature changes. It positively guarantees uniformity of each batch of core oil made.

Visit us at any time. We'll be proud to show you through our plant and explain from start to finish how we make "dependable core oil."

Questions and Answers

Question: Explain why core oil is invoiced on a weight basis although it is offered on a liquid gallon basis.

Answer: Except when core oil is made to an exact chemical specification, all manufacturers — to the best of our knowledge — have for years based a "gallon" on the nominal weight of 7½ lbs., just as do linseed oil producers, notwithstanding the fact that a gallon of core oil at a temperature of 60° F. may weigh more or less than 7½ lbs. depending on the ingredients used in the formula.

Although the common practice is to quote on a "gallon" basis, manufacturers base their cost and selling prices on a 7½ lb. gallon, so consequently foundries are not overcharged, *but it is important that whoever receives the oil should check the gross and tare weights, which are plainly stenciled on the head of each drum,* and report these weights to the purchasing department in order that the invoices may be checked.

As the majority of foundries still use core oil by volume, it is important to remember that the heavier the core oil the more it costs per gallon. *This is another reason why core oil should be used by weight.* For other important reasons why core oil should be used by weight, we respectfully refer you to previous Question and Answer columns in our FOUNDRY advertisements.

Top—Birdseye view of our 350,000 gallon plant at Cicero, Illinois.

Center—Part of our testing laboratory which is at the disposal of users and prospective users of "Dependable Core Oils" without obligation.

Bottom—A corner of our pump house, showing piping arrangement and one of our large batch scales for weighing the various oils of each formula.

If you have a novel time- or labor-saving practice that you employ in your core room that should benefit others—tell us about it so that we can pass the good word along.

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

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Stock and Representatives: Buffalo, N. Y. Elmira, N. Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn.

among Detroit foundries

BY A. H. ALLEN
Detroit Editor,
The Foundry

VOLUME of tank casting work spread throughout foundries of this state has reached tremendous proportions and is increasing. The three principal builders of tanks in Detroit—Chrysler, Ford and the Fisher Body Division of General Motors—have subcontracted large quantities of smaller cast parts going into tank assemblies with the result that steel foundries are loaded down with these orders.

Many new plants and enlarged plants have been required to handle the output, and estimates indicate Michigan is now or soon will be the source of greatest tonnage of steel castings. Expansion programs in the western part of the state at companies like Campbell, Wyant & Cannon, Auto Specialties and West Michigan Steel Foundry, plus the new steel casting facilities at the Saginaw Malleable Iron Division and at Ford in Detroit probably will more than double Michigan's steel casting potential. In addition, a few gray iron foundries are converting to steel, further bulwarking the output of this type of casting.

The shift from rubber to steel for tank treads has opened up new demands for steel castings and these parts are now being turned out by the thousands. A more recent development is the application of pearlitic malleable iron to these treads, and experiments indicate they are highly successful. In fact, several plants already are reported under way on production of pearlitic malleable iron treads. The material is understood to show remarkable wearing qualities in the grueling service to which treads are subjected.

In desert warfare, the track mechanism of tanks is subjected to withering wear from sand and reports from Libya to one automotive company here state that some tanks are being immobilized after short combat duty, because of the infiltration of sand into pins on the track links. Results of this desert sandblasting, as might be imagined, are none too fortunate.

After observing the immobilization of tanks in desert operations, some military experts declared the answer was to change to a trackless vehicle. Various types of wheeled combat cars have been in the design stage for the past year but there has been no great pressure on moving them into production, since tank demands were considered more important. The wheeled combat car has the advantage over the slower, lumbering tank in that it is highly maneuverable and is as fast as a jackrabbit. Lightly armored and carrying an assortment of machine guns and cannon, these cars are of the four, six and eight wheel types, driving on all wheels. They embody power steering, some on both front and rear wheels, power braking and can rumble over both smooth and rough terrain, often attaining speeds as high as 70 miles an hour.

With large rubber tires exposed to enemy fire, they might be considered vulnerable, but rely on their speed and maneuverability to escape direct hits, being difficult targets to draw a bead on. Furthermore, they can keep on going even with two or three tires shot away, and are not stopped like a tank with busted treads or chewed-up link pins. Right now these new types of vehicles seem to be moving in as opposition to tanks rather than substitutions for them. All summer the armored forces have been maneuvering them over vast stretches of territory.

An army man explains the tactics of the new vehicles, which substitute speed and firepower for the heavy armor of tanks, as follows: The idea is to catch your adversary sitting in his corner with his back turned, hit him behind the ear with brass knuckles, and then run full speed to a new position for another sneak punch. Guns on these "charging artillery" devices are mounted to fire forward, usually through about a 90-degree arc. There is no need for a full swing turret, because the car can be turned quickly to confront any target, thus simplifying the manipulation of guns.

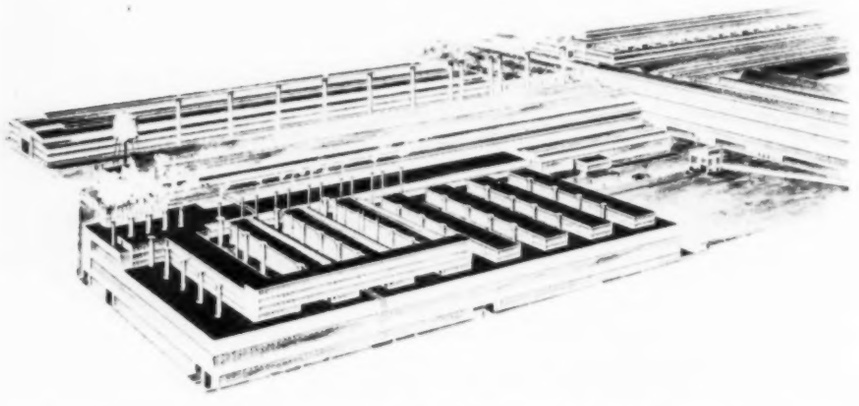
More Castings Needed

The British gun carrier is similar in some respects, except that it is much lighter in weight, being around 5 tons, while some of the types here run up as high as 22 tons. Obviously the expansion of the program is going to mean further demands on steel foundries since, like tanks and army trucks, the new vehicles require many castings in their construction.

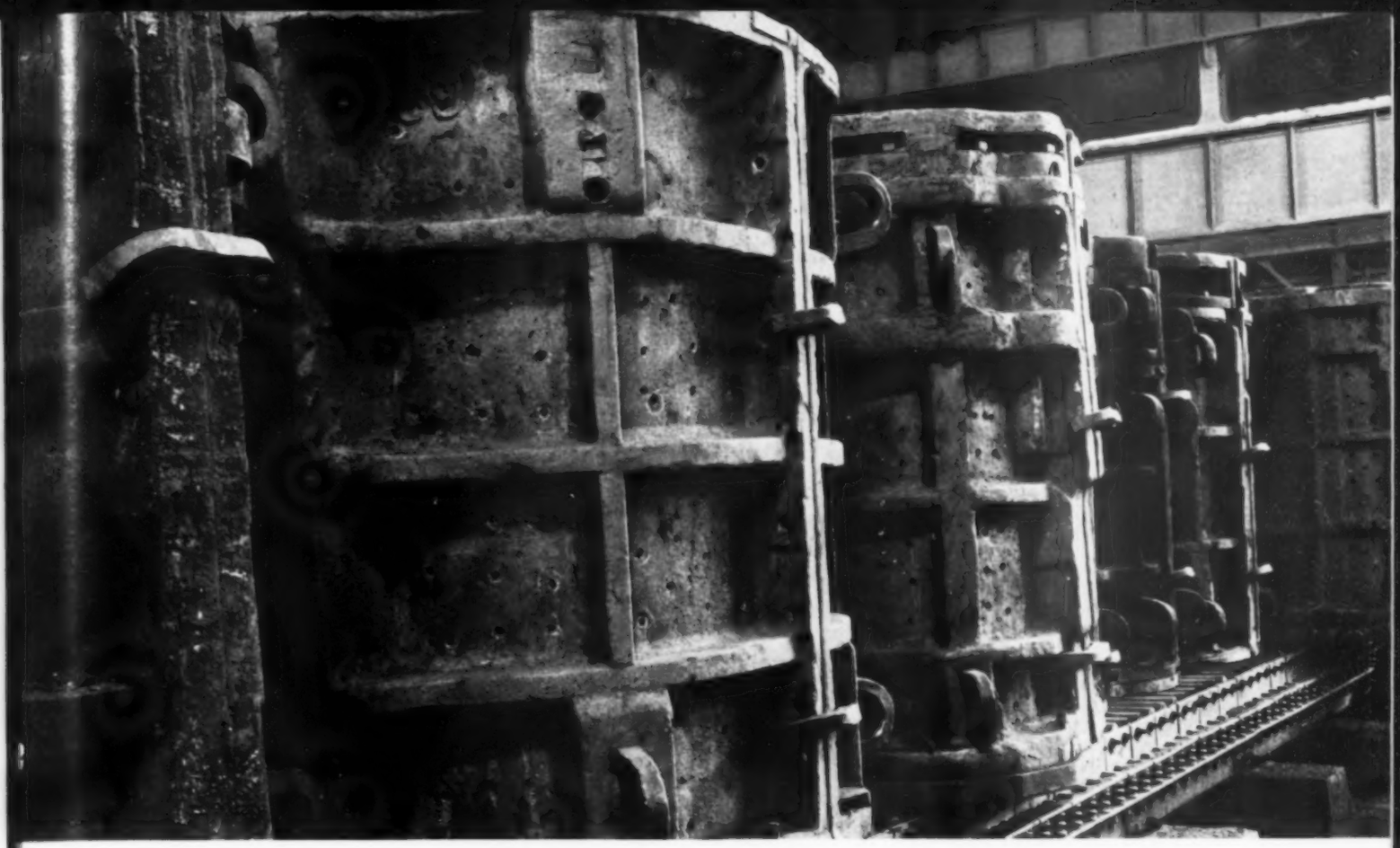
Recent orders placed by the Combat-Automotive Division of the Ordnance Department for 880,000 more army trucks in a wide range of types and sizes, will mean a steady demand for castings going into truck construction. Filling this order will take approximately the full capacity of the nation's truck industry for nearly one year.

Conversion of gray iron foundries to production of magnesium castings is a subject which has been pursued actively over recent months. Airplane engines of the radial type require from 100 to 300 pounds of magnesium castings apiece and despite expansion of castings facilities by Dow Chemical and the

(*Concluded on page* 101)



Architects' rendering of the new steel foundry structure for Ford Motor Co. Illustration courtesy Giffels & Vallet Inc., L. Rossetti, Detroit



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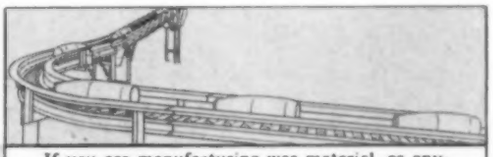
The success of the Allied war effort depends greatly upon the speed of our production — the output of coils and sheets, castings and forgings, bars and shapes — and thousands of other vital materials. American Industry has already come through in a way that spells disaster for the Axis nations, and it's only the beginning.

Mathews Engineers are spending long hours in solving the many conveying problems which go along with this great production program. You can get Mathews engineering service and Mathews Conveyers with much less delay than you might think. By furnishing the highest preference rating you can possibly obtain, along with complete information regarding your problem, much time can be saved in obtaining the conveying equipment you require. Our job is to serve you in the most efficient manner possible.

MATHEWS CONVEYER CO.

ELLWOOD CITY, PENNSYLVANIA



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer

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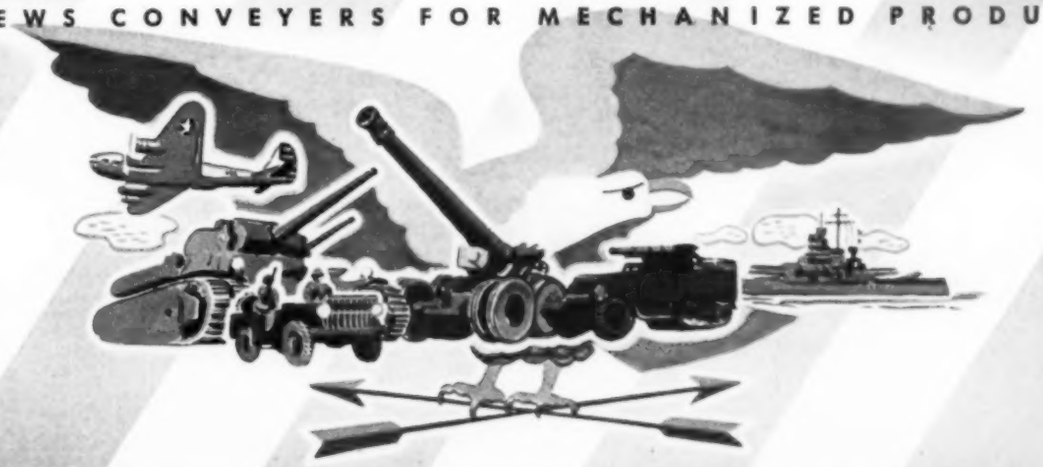

Visit Space D-111 at National Metal Congress

National need bears heavily now on one material, now on another, for the uses of wartime industry. In the *National Emergency Steels* that have lately been developed, Molybdenum plays an important part. As to the availability and usefulness of Molybdenum, Tungsten, and Boron, correspondence is invited by the Molybdenum Corporation of America. Printed matter is offered.

AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

MOLYBDENUM
CORPORATION OF AMERICA
GRANT BUILDING, PITTSBURGH, PA.

MCA

(*Concluded from page* 98)

Magnesium Fabricators Division of Bohn Aluminum, still more production appears needed.

One of the leading automotive companies has been investigating this field, and early in June submitted proposals for a new foundry to produce 1,000,000 pounds of castings a month at an upstate location. However, the no-building order issued by the WPB scotched this proposal so the plans were changed to cover conversion of a present gray iron foundry to magnesium.

Some interesting figures were assembled on relative productivity on magnesium and gray iron automotive castings. Output in gray iron figured to 12,000 pounds per man per month and 100 pounds per square foot of floor space per month. Best estimates on magnesium indicated 250 pounds per man per month, and 3 pounds per square foot of floor space per month.

Report Car Shortage

Tremendous volume of material being shipped from war plants to coastal embarkation points has induced a critical shortage of flat-bottom gondola cars, as well as ordinary flat cars. Foundries receiving sand shipments in gondolas are being urged strongly to switch to hopper cars. This in some cases requires revamping the methods of handling incoming sand, but the car shortage is said to make such changes imperative.

Supplies of hopper cars and box cars are not nearly as tight as flat-bottom carriers, so a change from gondolas would facilitate sand shipments to foundries. Some plants receive sand in box cars, despite the 20 per cent higher freight rate in this type of car. Protests have been lodged against this premium assessed on box car shipments, but so far they have fallen on deaf ears. No logical explanation has been offered as to why bulk shipments like sand should take a higher rate in box cars, but the charge is looked upon by sand interests as unfair.

A noticeable change in the types of sand purchased by foundries has been the logical aftermath of the slowing in gray iron production and the increase in steel and the light metals. Supplies of sand are ample, but sellers are hampered by the difficulty in obtaining repair parts for equipment at pits, often necessitating shutdowns; and the increasing problem of maintaining labor forces in the face of high wages paid at war production plants and on government jobs.

One example is cited of a tractor operator being offered $1.75 an hour on a government job, which is far beyond what any sand company is able to pay an operator of this type. Wages of sand shippers are estimated to have increased at least 50 per cent in recent months. Inroads of the draft also have had telling effect on labor supply.

Foundry of Donaldson Bros. at Mt. Clemens, Mich., long inoperative, has been taken over by a Detroit machine shop and plans launched to move equipment of 50 or more "garage and basement" shops in the Detroit area to the old foundry. A single 3-ton cupola was once operated in the shop which produced miscellaneous types of gray iron castings.

Gray Iron Founders To Study Problems

One of the most important gatherings of gray iron foundry executives in the history of the industry will be held in Cleveland on Oct. 9 when the Gray Iron Founders' Society stages its fourteenth annual meeting. Prominent men from OPA and WPB will be present to discuss and to answer questions on various phases related to the war and the gray iron foundry industry. The program will include the following speakers:

Donald D. Kennedy, price executive, Iron and Steel Branch, OPA, who will speak on the why and how of price freezing, and the place of the industry in the scheme.

William Kerber, chief, Pig Iron Unit, WPB, who will discuss the reasons why pig iron control is necessary, and how it is accomplished.

Don J. Reese, chief, Manufacture and Raw Material Unit, Metallurgical and Specifications Section, WPB, who will talk on what to do when customary materials are not available to secure suitable castings.

C. D. Scully, chief, Scrap Section, Iron and Steel Branch, OPA, who will discuss operation of the schedule of scrap prices, and what the foundry industry can do to make the plan function.

Earl L. Shaner, president, the Penton Publishing Co., and editor-in-chief, *Steel*, will talk on the industrial situation at the luncheon.

Issues Handbook

The Metal Industry, 22 Henrietta street, London, England, has published the 1942 edition of its *Metal Industry Handbook* containing 456 pages. It is divided into four sections covering general properties of nonferrous metals and alloys; general data and tables; electroplating, finishing, galvanizing and anodizing, and miscellaneous. The book forms a valuable compendium.

Production Merits Army-Navy "E"

Bullard Co., Bridgeport, Conn., recently was presented with the Army-Navy "E" pennant for its production efforts. The pennant was presented by Col. F. H. Payne, assistant chief, Springfield Ordnance District, and was received by E. P. Bullard, president of the firm. Army-Navy "E" pins were presented to the employes by Lt. Commander R. T. Fish, liaison officer, U.S.N. and WPB, and received on their behalf by Vincent A. Hughes, chairman of the Bullard War Service Club

YOUR PRODUCTION is their job for the duration

★ There's just one goal now for all of us, and that's Victory—complete, absolute, final. The concentration of effort which that goal demands leaves no room for selling activities as we used to know them. It's everybody's job now to help *produce*—produce on a vast, coordinated and accelerated scale that will overwhelm the enemy on every front.

That's why these men today are the Service Contact Staff of Osborn Manufacturing Company. They have just one job—to help you, the foundrymen on whom this nation and its allies are depending for urgently needed war supplies, to get maximum production and efficiency from your Osborn Moulding Machines and Core-Blowers.

Heading the staff is R. F. Lincoln, Service Contact Manager. He can be reached at Osborn's home office in Cleveland, Telephone: ENdicott 1900.

G. G. Adam, 119 Glen Avenue, Glen Rock, N. J., is at the service of foundrymen in the Eastern states.

Detroit district foundries are the responsibility of E. A. Blake, 1233 Audubon Rd., Grosse Point, Detroit.

H. B. Kiefer, 567 Anthony St., Glen Ellyn, Ill., serves foundries in the Chicago and St. Louis areas.

In Northern New York, Western Pennsylvania, Maryland and the District of Columbia, your man is H. B. Klar, 39 Grimsby Rd., Kenmore, N. Y.

Covering the Eastern Middle West, from the Great Lakes to the Gulf of Mexico, is Leon F. Miller. He can be reached at the home office.

For help on foundry production problems get in touch with the Osborn Service Contact man in your district. Your production is his job.

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E. A. BLAKE . . . . . Detroit District
R. E. KIEFER . . . . . Middle Western District
H. B. KLAR . . . . . Central Eastern District
L. F. MILLER . . . . . Eastern Middle West

the adventures of Bill

THE Irish," said Bill the other night, apropos of nothing in particular, "are a remarkable people."

"You amaze me, my dear Watson," I said, "at the depth and penetration of your remarks. You seem to know everything. I suppose you will follow that bright gem of information by telling me the sea is salt, the sun appears by day and the moon by night, the seasons follow each other in regular and unceasing succession, and the rivers flow down to the sea."

"Not all of 'em, boyo, not all of 'em. Some rivers flow into the lakes and others disappear in holes in the ground and never are seen again by mortal man. I am willing to throw in with you on the salt in the sea, appearance of the sun and moon and the progress of the seasons, but you can mark down the rivers flowing down to the sea as a misdeal. Shuffle 'em up and come again with your toe gently touching the brake."

"Shuffle them yourself," I said. "Perhaps you can find the joker who prompted you to spring an old saying current in the Owld Dart since King McCarthy I dispensed the high justice, the middle and the low from Tara Hall and ran a big blast furnace up near Londonderry to supply direct metal for the foundry where the clan were engaged for ten years in casting the columns for the Giant's Causeway."

"That is Ironton Firebrick McCarthy's story. The blast furnace gang became staving drunk one night and neglected to tap the furnace at the proper time. She bust out and all the iron ran down into the sea. The water became so hot that down to this day Ireland, about in the same latitude as Siberia and Labrador, enjoys a mild and delightful climate.

"They were great min in thim days. Under different conditions, their descendants exhibit some of the national characteristics. Recently a handy lad sent the following communication to W. E. Cosgrove, No. 1 man in Dublin:

My shattered financial condition is due to national laws, state laws, county laws, city laws, corporation laws, liquor laws, mother-in-laws, sister-in-laws, brother-in-laws and outlaws. Through these laws I am compelled to pay a business tax, school tax, petrol tax, light tax and excise tax. I am required to get a business license, a dog license and marriage license. I am also required to contribute to every society and organization which the genius of man is capable of bringing to life; women's relief, unemployment relief, and gold digger's relief. Also to every hospital and charitable institution in the city.

For my own safety I am required to carry health insurance, life insurance, fire insurance, property insurance, earthquake insurance, accident insurance, storm insurance, unemployment insurance and old age insurance.

My business is so governed that it is no easy matter to find out who owns it. I am inspected, expected, suspected, disrespected, rejected, dejected, examined, re-examined, informed, required, summoned, fined, commanded, and compelled until I provide an inexhaustible supply of money for every known need, desire and hope of the entire human race. Simply because I refuse to donate something or other I am boycotted, talked about, lied about, held up and robbed until I am almost ruined.

I can tell you honestly that but for a miracle that happened I could not enclose this check. The wolf that comes to many doors has just had pups in my kitchen. I sold the old pelt to the fur man, and the pups to the zoo, and here is the money. I sincerely hope it does someone a whole lot of no good.

"There y'are," said Bill. "The whole blinkin' kettle of fish in a nutshell."

Price will include sales tax

"Well," I said, "as Mr. Snagsby in Dickens' *Bleak House* was wont to remark, 'Not to put too fine a point upon it,' wars have been the cause of more or less trouble since the world began.

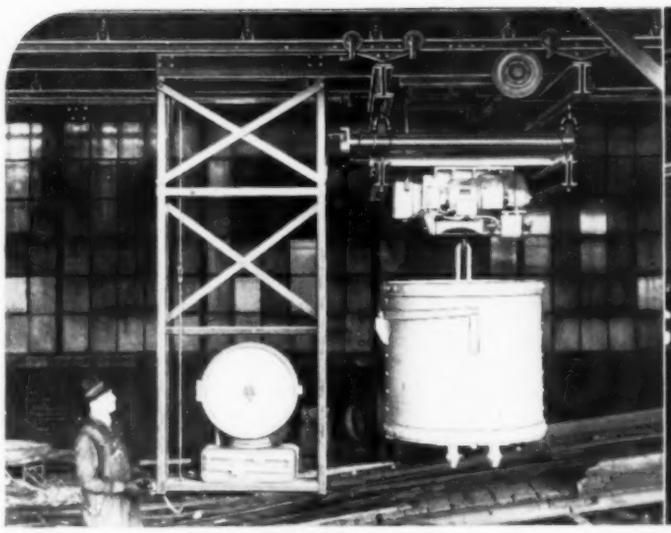
"Almost 3000 years ago two heavily bearded members presumably in good standing, dues fully paid up in the N.P.O. or National Prophets Union, issued a statement remarkable in many respects. There is no direct evidence of collusion, connection or collaboration between these two journeymen practitioners of the prophetic art. They did not belong to the same local and in all probability did not even know each other. One lived in Jerusalem and the other lived in a little jumping-off place or whistle stop on the main highway between Egypt and Assyria. Not very far apart reckoned by modern standards of transportation, but a truly stupendous distance when the traveler's only means of locomotion over hills and deserts was to plod wearily along on his own two blistered feet."

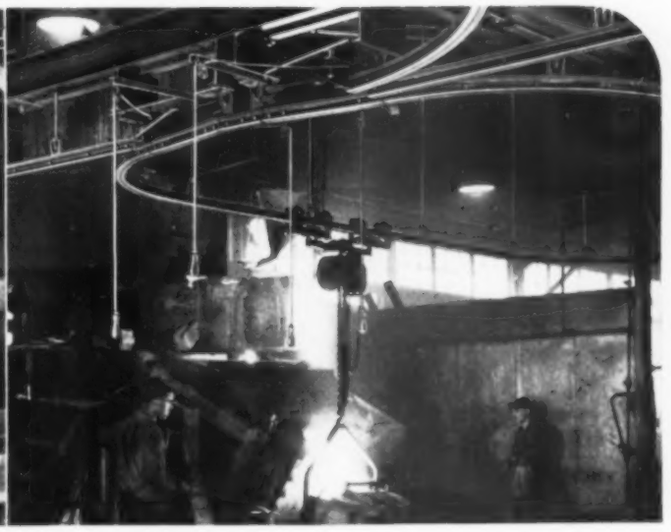
"You don't have to go back that far," said Bill. "With gasoline restricted to a tin cupful once a week, the Down East inhabitants are either stopping home, or hopping around on the old dogs."

"As I was saying, these two men did not know each other and yet in the recorded sayings and doings of both citizens, 228 pages apart in the revised version of the Old Testament, the statements are worded exactly alike. According to learned modern commentators who have a good working grip on ancient history, Isaiah in the big league coined the statement in one of his good days at bat. Micah picked it up somewhere in the bush league and calmly reissued it as his own. Plagiarism, as these hoary savants point out—and who should know better? —is by no means a modern development. Members of a second school of commentators, probably just for the sake of argument, hotly claim the names should be presented in reverse order. That leaves honors about even with the box score 0 to 0. Peanut quotations remain steady at five cents a bag.

"Touching on the mess their beloved country had been and was in, and bravely looking into the past, present and future, both men confidently declared a better day was coming when men would quit the silly game of war. 'They shall beat their swords into plowshares and their spears into pruning hooks; nation shall not lift up sword against nation; neither

(*Continued on page* 106)





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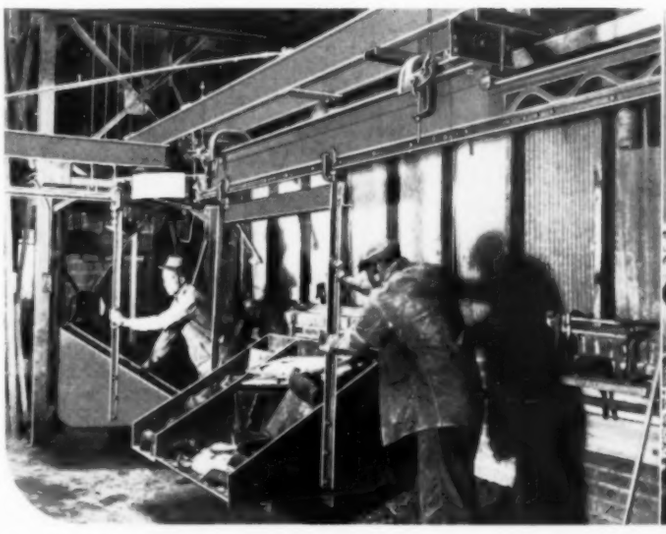


(*Continued from page* 104)

shall they learn war any more.'—Isaiah XI-4; Micah IV-3. Unfortunately, either by accident or design, they omitted any reference to a definite date when the blacksmith's anvil would commence ringing. When the nations would sit around the camp fire or the smithy and smoke the pipe of peace.

"In the thousands of years since the prophecy was made, the earth, the moon, the stars and the great constellations have wheeled through their accustomed circles in the universe. Millions of men, women and children have perished by the sword. Time and again the rivers have run red and the earth has been drenched with the blood of the slain. Today with practically every nation in the world involved, directly or indirectly, the blessed days of peace seem farther off than when the prophets chanted either in solo or duet, 'They shall beat their swords into plowshares and their spears into pruning hooks; nation shall not lift up sword against nation; neither shall they learn of war any more.'"

"Learn about war no more, hey? The old boys' intention was good, but their batting eye was not quite up to the mark. Human nature never has changed either in the arts of war or peace. Every generation has to learn its own lesson in many instances right from the beginnings. I had an inquiry recently from a foundryman who wrote that he would appreciate suggestions on the best method of molding and gating a gray iron tool base 28 inches wide, 30 inches high and 78 inches in length. These castings were outside their usual line. The pattern is made for molding with the ways on the bottom. Inside of the mold to be formed with a dry sand core in six sections. Since the cores cut through on the bottom only in a narrow gap, the weight is supported by wide shoulders resting in prints on top of the drag part of the mold. Casting weight is 2150 pounds. He inquired if a cope flask is necessary, or if the cores could be anchored satisfactorily to serve as a cope.

"Assuming that the mold is made in a substantial cast iron flask, no cope is necessary. Short pieces of rails laid transversely on the cores, or longer pieces laid longitudinally may be clamped to the upper flange of the drag, or longer clamps may be employed to engage the bottom plate. The rigging must be strong because the static pressure exerted against the bottom of the cores is about 17,000 pounds. If the clamps or bottom plate yield even to a slight extent, the casting will be too thick on the bottom and the cores may shift slightly to one side or the other and thus produce difference in the thickness of the walls.

"Method adopted in adjusting the binder rails will depend on the style of pouring basin and on whether the casting is poured from one or from both ends. This feature in turn depends on the character of the sand in the mold, and to some extent on whether the mold is green sand, skin dried, or dried in the oven. With suitable sand, a casting of this kind can be produced in a green sand mold. However, to be on the safe side, the majority of foundrymen prefer to skin dry the surface. In addition to eliminating any hazard from dampness in the sand, the dried surface facilitates the flow of metal and also insures a clean, smooth skin on the casting.

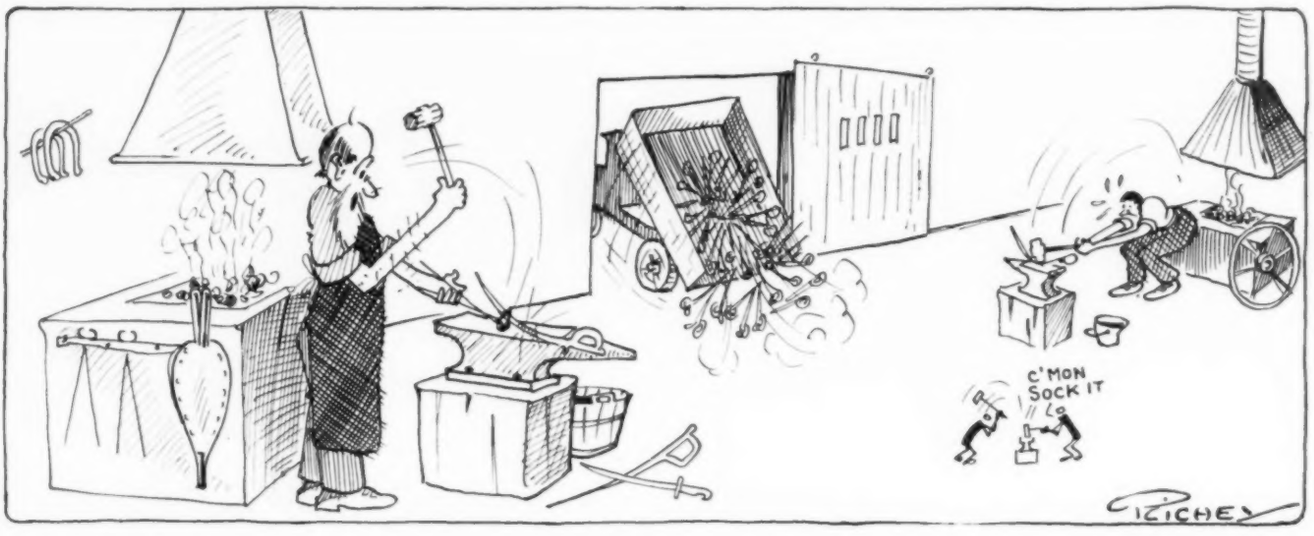
"Since the weight of the cores is carried by the extension on the upper core print, it will be necessary to provide substantial bearings under these prints. These bearings may be pieces of plates, lengths of rails, or special pedestals extending to the bottom plate. Where a considerable number of castings is required, the flasks may be fitted up in a special manner with short chuck bars cast integrally or bolted to the inside of the drag. The bearing edge of the bars is machined accurately to rest on the face of the core print of the pattern in the ramming position, and later to serve as a support for the print on the core. Incidentally, prudence dictates the use of a metal or dry sand core base for the long narrow core print in the bottom of the mold. Unless lowered in an extremely accurate manner, the bottom print on the large main core will shave one side or the other of a green sand core print in the bottom of the mold. The sand thus displaced will prevent proper seating of the core, and in addition will leave space for an unsightly fin on the castings.

"The traditional method of gating this type of casting, a method still practiced extensively, is to place two upright sprues at the end connected to the mold cavity by thin vertical gates leading into the space between the core and the mold. In some instances one gate at each side at or near the bottom is sufficient. In other instances it is advisable to place one gate near the bottom, and a second gate close to the top. Two ladles and gates at both ends are necessary on long castings.

"A desire to conserve metal induces the foundryman to gate short or comparatively short castings at one end. This does not always reflect good judgment. Where an excessive amount of metal enters through a small gate opening, a tendency exists for the sand in the vicinity to become eroded with consequent rough surface on that part of the casting.

"A much more satisfactory method for pouring the metal into the casting under discussion is to provide a number of small gate openings in the covering core directly over the side walls of the casting and pour the metal into a long basin ex-

(*Concluded on page* 135)



According to present indications the process of converting swords to plow shares has been postponed again

to Adolph...with no love!

If you could see the flow of perfect, flawless castings from America's foundries today, Herr Ratt, that funny little mustache of yours would crawl into a hole and take you with it.
The world of metal working has never seen so big a job done so fast . . . and so well.
And contributor to this effort is Penolyn Core Oil. Quick-baking, fast cleaning, with minimum tendency to form gas . . . it brings *fewer rejects, more perfect castings from perfect cores!*
If you've got casting problems, Penola's engineers are yours to command. Call them in today.

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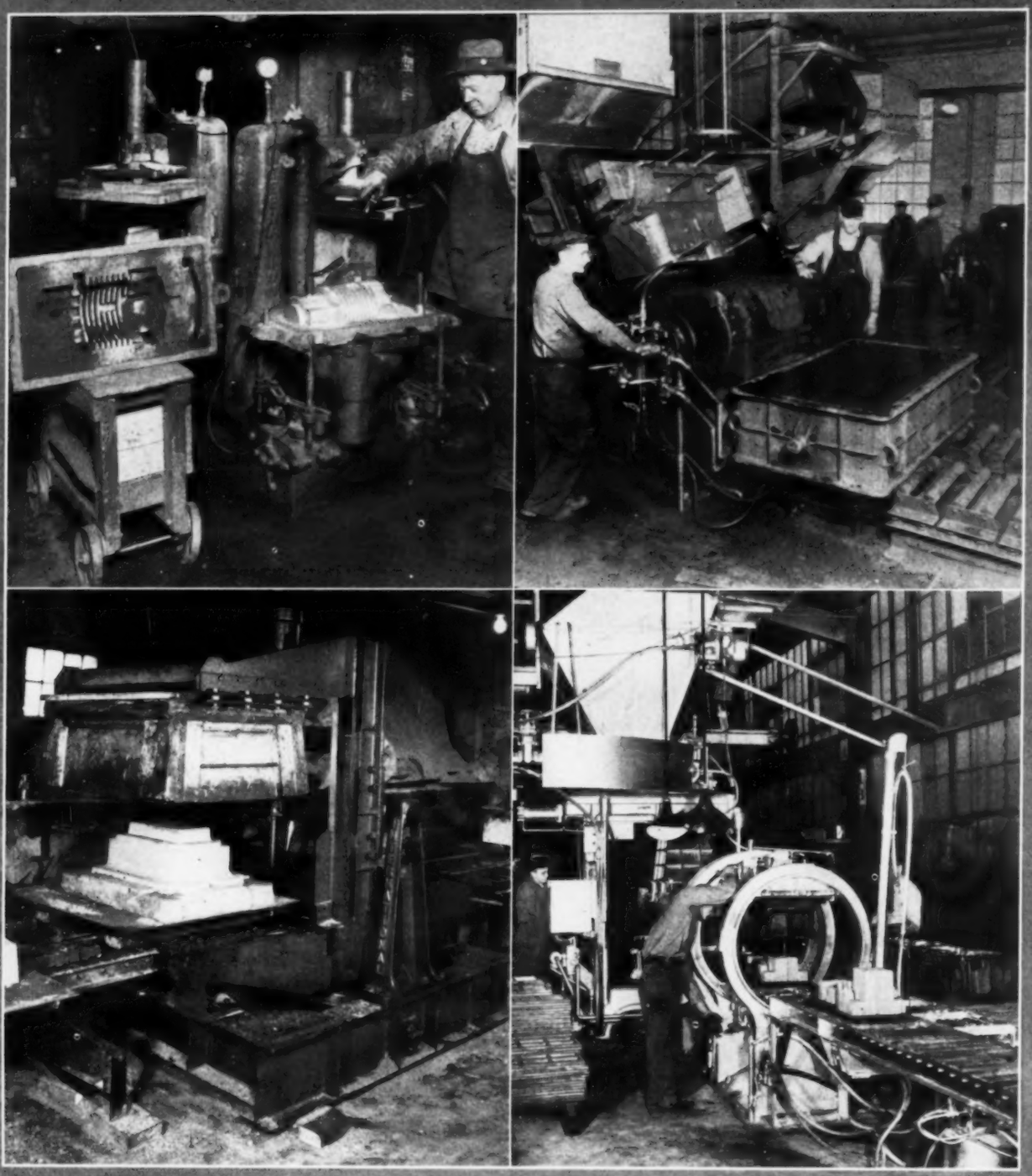

Upper left	Type PKL	Jolt, Squeeze, Power Pin Lift Machine
Upper right	Type F	Jolt, Power Turnover, Power Draw Machine
Lower left	Type AN	Air Clamp, Air Turnover, Air Draw Machine
Lower right	Type SB17	Core Blower and Type RED Machine for Clamping, Turning over and Drawing

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INTERNATIONAL MOLDING MACHINE CO.

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Foundry Developments at short range

ONE foundry producing nonferrous castings by the centrifugal process reports beneficial results are obtained by coating the molds with an extremely thin layer of bentonite. The bentonite is blown in through the open end of the mold as it rotates at operating speed. Only a small amount is used since an excess tends to be picked up and carried along by the molten metal. It is believed to be particularly efficacious where fine, hair-like fire cracks develop in the mold. Those cause difficulty in removing the castings, but the bentonite seems to fill them up, preventing that trouble.

° ° °

With the growing shortage of tin it will not be surprising if use of tin-lead solders will be curtailed greatly. Two types of lead-silver solders which are suggested as alternatives contain 2½ per cent silver and 97½ per cent lead, and a priority alloy containing 2.5 per cent silver, 0.25 per cent copper, and 97.25 per cent lead. The first flows at about 580 degrees Fahr., and the other about 661 degrees. Those silver solders cost less than lead-tin solders containing over 25 per cent tin. Since they have higher melting points than lead-tin solders, higher temperatures can be applied in baking synthetic coatings, etc.

° ° °

Steel spool castings 12 inches diameter, with 4-inch hub and a ¾-inch thick flange at either end are cast with the flanges in a horizontal position in a core mold assembled inside a cast container. The core contains a minimum amount of sand since the metal container supplies the necessary reinforcement against pressure of the metal poured rapidly from a bottom pour ladle.

° ° °

Perfect absorption of various powdered alloys used in gray iron foundry practice is claimed to be secured through a recently patented type cupola spout. The spout is covered and the alloy is placed in a funnel near the breast. The funnel extends to a point near the bottom of the spout. The stream of iron leaving the tap hole flows under and on both sides of the funnel opening. Subsequent travel carries the iron through a number of curved baffles which fold and refold the stream upon itself. The iron does not flow through the open end of the spout as in ordinary practice. The end of the spout is closed and the iron acquires a whirling motion before it flows through a hole through the bottom of the spout and into the waiting ladle.

° ° °

WITH the shortage of lead and antimony, it is important that careful attention be given to prolong as long as possible the life of industrial truck and locomotive batteries. They should not be over-discharged consistently. Greater efficiency and longer overall life are secured from batteries with regular charging. Two instruments are available to determine when a battery has delivered its rating and should be recharged. One is the ampere-hour meter, and the other a newly developed discharge indicator. The latter is mounted on an industrial truck where it can be seen easily by the operator. As soon as the truck's battery nears the point where a recharge is necessary, a red signal lamp lights up.

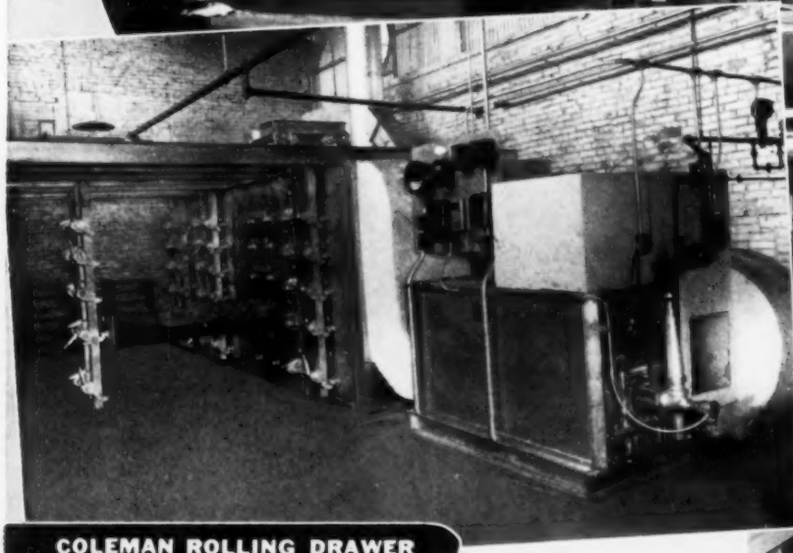
° ° °

A speed-up in hardness determinations where a large number of pieces of similar hardness are to be tested is said to be accomplished through a device called a comparator. It consists of a table mounted yoke which supports a penetrator placed over an anvil. The die end of the penetrator is the same size as that used in the Rockwell hardness tester. The piece to be tested is placed on the anvil which moves upward against the penetrator under pressure of a piston operated by compressed air under 100 pounds per square inch. Depth of indentation is shown by a dial indicator attached to the penetrator. The device is calibrated by determining the hardness of a piece with a Rockwell machine, and then noting the position of the needle of the indicator gage on the comparator with the same piece.

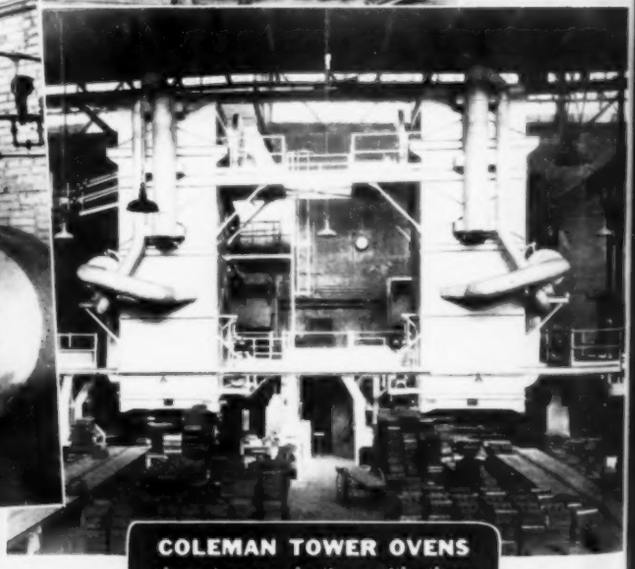
Coast Artillery gun mounts under construction in the shops of The Baldwin Locomotive Works. The mounts weigh 250,000 pounds each and are built from steel castings produced in Baldwin foundries. These are one of several types of war material being manufactured by the century-old locomotive builder

Perfect Core Baking

COLEMAN CAR TYPE CORE OVENS
For all classes of heavy and medium cores.



COLEMAN ROLLING DRAWER CORE OVENS
Wide range of sizes for high speed baking of medium and small cores.



COLEMAN TOWER OVENS
Amazing production with these high-speed continuous ovens.

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...and Mold Drying... 50 to 75% Faster, with COLEMAN OVENS

over 6,000 INSTALLATIONS

COLEMAN TRANSRACK CORE OVENS
Most popular all-purpose type of core oven. Wide range of standard sizes.

No matter how carefully you select your sands and core binders or how skilled your core makers, your cores can't be right unless they are baked right! Therefore, in times like these when it is so essential to avoid core make-overs and casting rejects, select Coleman Ovens to do the job right—faster, better, cheaper!

For over 36 years, we have specialized in the design and construction of fast, efficient and economical core and mold ovens. This, together with the experience gained in building over 6,000 installations, is the reason for the outstanding preference of leading foundries for Coleman Ovens.

Coleman Ovens are available in all types and sizes—for operation with any fuel. Write for Catalog.

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BUILDERS OF COLEMAN AND SWARTWOUT OVENS
CONTRACTING ENGINEERS AND MANUFACTURERS
CLEVELAND, OHIO

CORE and MOLD OVENS

WHAT do customers think and say about castings? To get an answer on this important question, the editor of our contemporary *The Foundry Trade Journal*, published in England, visited several industrial organizations not operating foundries and discussed the problem with the works' metallurgist. His report, published on the editorial page of the Aug. 6 issue of that publication, contains so much food for thought that I am reproducing the entire discussion as follows:

A WORKS VISIT

The particular works we visited has no foundry, but is a large user of castings. It is probably due to this fact that its management is less sympathetic to castings than those which have foundries attached to them as a manufacturing department. The works' metallurgist, exceptionally, was an ardent, though critical, advocate of the extended use of castings. His views are worth recording as indicative of the steps necessary to be taken for ensuring the future stability of the industry. He asserted that there had been a remarkable improvement in the mechanical strength and soundness of gray-iron castings in recent years, especially when made by firms utilizing enlightened metallurgical control. Dimensional accuracy, however, still needs attention. He had in his laboratory under investigation a complicated pump casting, which had failed in service. When sectioned it disclosed (a) excessive corrosion leaving graphite flakes in relief at the working surfaces; (b) draws at all the metal junctions; (c) many porous places and blowholes; (d) extreme and dangerous variation in the inner wall-sections; and (e) a microstructure to be associated with a complete lack of metallurgical control. This, in the metallurgist's opinion, was the sort of happening which prejudiced designers against castings. Light alloy castings, in his opinion, were not uniformly satisfactory, and, unlike gray iron, it was not the firms with a superabundance of metallurgical supervision which produced the finest castings, but some concerns of relatively modest dimensions possessing, no doubt, a wealth of practical experience. Light alloy die castings never attained the satisfactory levels reached by hot pressings. Steel castings he did not use. The most important statement he made was that, when in conference with service technicians considering the design and manufacture of a new component, any suggestion as to the suitability of a casting was ruled out without discussion! Asked for his advice as to how to popularize castings with designers, he suggested that, as the two main factors were dimensional accuracy and internal soundness, the remedies were obvious. For the former, greater attention must be paid to the production and maintenance of patterns, coreboxes, core carriers, gages, jigs and box parts, coupled with rigid inspection. For the second, every foundry must have an x-ray apparatus and unceasingly apply remedies to any faults disclosed. Finally, there must be enlightened publicity to overcome the present prejudice existing in high quarters.

To what extent this gloomy picture represents general opinion it is difficult to gather, as local environment has a profound influence, and it is possible to paint a second picture which would reverse perspective, tint, and shadow. One of the most successful of British aero engines incorporates a quantity of castings. These, at low cost, have responded magnificently to every test, both shop and operational, imposed upon them. We grant that there is a tendency towards making as many die castings as possible, because of speed of production. The works, like many others, had had to sacrifice much of its peacetime production, and concentrate on war work of a light engineering character. At one point in the tour we were called to attention by the loud speaker and listened to the voice of the managing director. His message was to the effect that the most important contract they had ever received would shortly be put into production. The tooling up was finished and, as could be taken for granted, the tool room had done a real good job of work. The machine tools were lined up ready for going ahead. Experts from the main contractors would be in attendance in the dining room to explain to the operatives exactly what functions the gadget played in aerial warfare and the importance of each component. Moreover, there were to be three film shows which would underline the extreme importance of the gadget and the care needed in its production. He concluded his short address with an appeal to save fuel, light and water throughout the whole of the works. The last department to be visited was the power station, where the whole of the piping had been welded. After a dozen leaks had occurred, the original contractors had, at their own cost, rewelded the whole job, substituting in the more crucial positions flanged joints. We left the works feeling that industries other than the foundry had their troubles also.

—□—

The WPB has added core boxes and core dryers to the list of uses eligible for low grade aluminum. As before, match plates, patterns and snap flasks are permitted low grade aluminum, provided that the customer certifies in writing to the manufacturer that the use of these items is essential to the fulfillment of quantity production orders bearing priority ratings higher than A-2. A customer may use aluminum to make new pattern equipment provided the customer certifies this will be used for quantity production of orders bearing A-10 or higher, and will supply an equivalent weight of defective or obsolete aluminum pattern equipment. The manfacturer must get approval on Form PD-26.

—□—

It is interesting to note that both orders and production of malleable castings gained in July, according to Department of Commerce figures. Production was 61,434 tons compared with 59,990 tons in June. Orders totaled 63,531 tons, a gain of 8319 tons over the previous month.

—□—

The A.F.A. reports that a number of its committees will meet in Cleveland the week of Oct. 12 during the Metals show.

—□—

My apologies to the Office of War Information and that excellent photographer Palmer. A credit line "Official OWI photo by Palmer" should have been carried for the two splendid photographs that were reproduced on page 81 of the September issue of THE FOUNDRY.

F. G. S.

VOLCLAY BENTONITE
NEWS LETTER

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

Steel Molding Sands – Have you read the Morey & Taylor A. F. A. paper "Some Properties of Synthetically Bonded Steel Molding Sands"? Contains much interesting data for iron foundries as well as steel. We condensed its 36 pages into a 4-page leaflet with the meatiest facts boiled down for the busy foundryman. Includes 11" x 25" reference wall chart.

Gels and Dispersions – On the chance that these printed words may be seen where bentonite is made into gels and dispersions, we call attention to the fact that we have developed a special method for dispersing bentonite in water which is a phenomenal time-and-equipment-saver.

New Emulsifying Method with Bentonite – By a new procedure developed in our laboratory, light oil emulsions are greatly improved in stability and in many cases with less bentonite required.

Effective Water Stoppage – In concrete or earth reservoirs, dams, building foundations, wood and concrete water tanks, Volclay bentonite will stop leakage effectively. For instance, pits in foundry floors below ground water level can be kept dry by a simple procedure using Volclay. The application of Volclay to stop water seepage may serve a useful purpose in your foundry or associated departments.

AMERICAN COLLOID COMPANY

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PLEASE SEND THE FOLLOWING BULLETINS:

Check ☐ Digest of Morey & Taylor article with wall chart.

☐ Bulletins No. 226 and 238 – Easy Methods of Making Bentonite Gels and Suspensions.

☐ Bulletin No. 229 on Effective Water Stoppage (illustrated).

☐ Bulletin No. 205-B on New Emulsifying Method.

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VOLCLAY BENTONITE HAS SERVED FOUNDRIES FOR 15 YEARS!

Air view downtown Cleveland showing Public Hall in left center foreground

INCREASING WAR PRODUCTION

Theme of

METAL CONGRESS

FEATURE of the annual Metal Congress and Exposition to be held at Cleveland Public Auditorium Oct. 12 to 16 will be 25 war production sessions arranged by the American Society for Metals. These will be concerned with various phases of increasing production of war materiel. W. H. Eisenman, secretary of the society, states that the sessions will be patterned after the successful 'Defense Meetings' of the previous Congress. Outstanding authorities in government and industry will speak. The sessions will be informal and off-the-record, and all speakers will form an information panel for open discussion at the close of each session. The following subjects will be discussed in the 25 sessions:

Manufacture and Heat Treatment of Magnesium Castings.

Practical Programs for Segregation, Collection and Reclamation of Metal Scrap.

Problems Associated With the Large Expansion of the Steel Foundry Industry.

Metallurgical Aspects of the National Emergency Steels.

Doing More With What Alloys We Have by Using N. E. Steels.

Doing More With Available Tool Steels.

Selecting the Proper Die Steel for Mass Production.

Use and Interpretation of Radiography as an Inspection Method.

Recruiting, Training and Handling Inspectors of Metallurgical Materiel.

Speeding the Job by Better Production Heating for Softening (Prior to Hot Work).

Use of Powdered Metals in War Products and Tools.

Speeding the Job by Better and Faster Production Hardening.

Getting by With Low Tin Alloys.

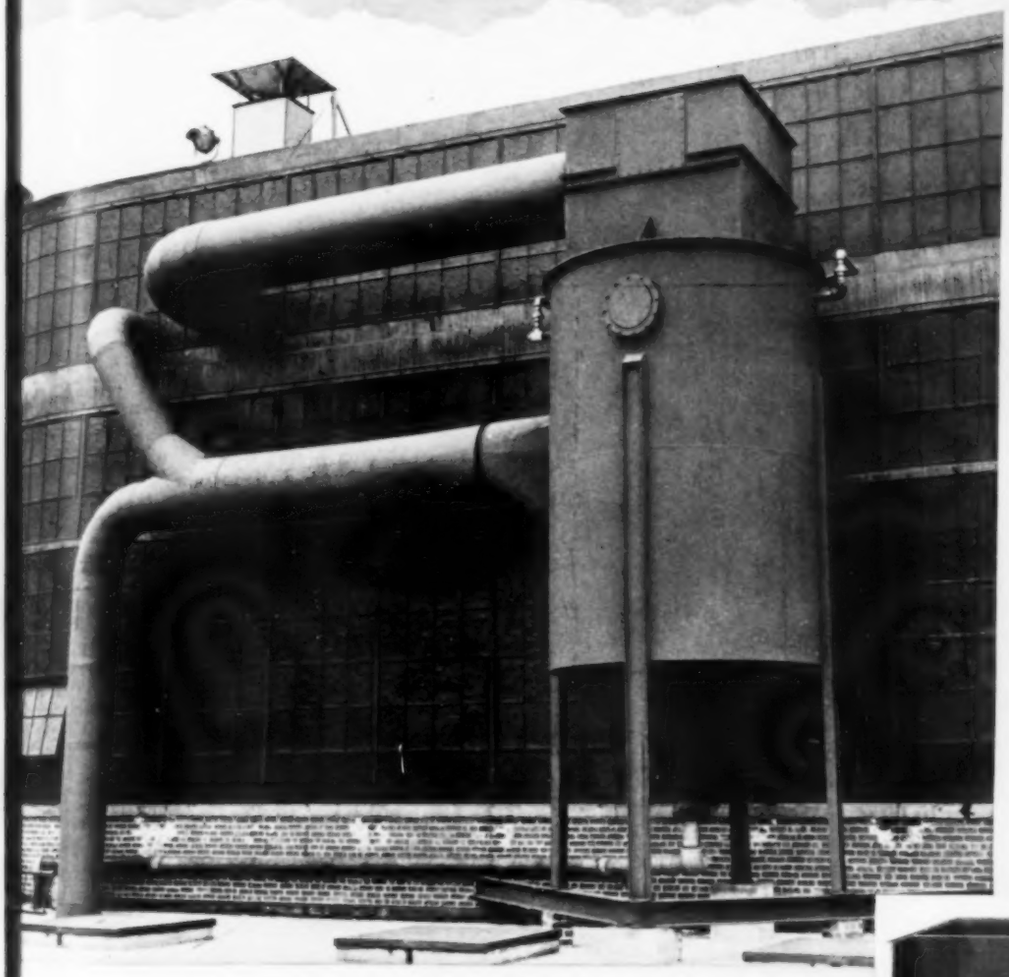
Making More Steel in Our Open Hearth Plants.

In addition to the special war production sessions, regular technical meetings will be held by the American Society for Metals, American Welding Society, Wire Association, and the Iron and Steel and Metals divisions of the American Institute of Mining and Metallurgical Engineers. Over 100 technical papers will be presented at the various sessions. Another feature of the meeting will be a 5-day lecture series starting at 5 p.m. each day. They will be conducted by James P. Gill, and will deal with various phases of tool steels.

Technical program of the American Society of Metals comprising 12 sessions will contain 37 papers while that of the American Welding Society covering 15 sessions will include presentation of 55 papers. Eleven papers will be presented at 6 sessions of the Wire Association to be held on Monday, Tuesday, Wednesday, and Thursday morning, Oct. 12 to 15. The Metals division of the American Institute of Mining and Metallurgical Engineers in a 3-day meeting will conduct one all-day session devoted to a symposium on rare and precious metals. Other sessions will pertain to discussions on constitutions of various alloys. The Iron and Steel division of A.I.M.E. will hold sessions on production phases for pig iron and steel. One paper of considerable interest to be presented will be on "The Effect of Tin on the Properties of Plain Carbon Steel," by J. W. Halley.

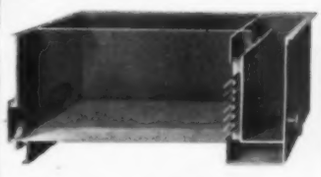
Over 250 manufacturers have reserved 95 per cent of the space available in Cleveland's Public Auditorium for the Metal Congress Exposition. The firms will feature educational and consulting services in their displays. With hundreds of manufacturers' experts on hand there will be every effort to help visitors increase their prdouction of war goods in the nation's present all out drive to victory.

Why put up with DUST?

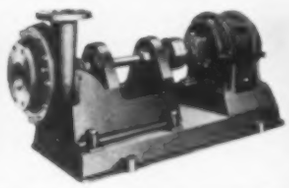


For health, safety, and efficiency of your workers eliminate dust the effective way—*with water.* The Whiting Hydro-Clone scrubs up to 99.6% of the dust out of foundry air—collects it as sludge—gives complete dust control. Especially valuable in connection with sand blasting, tumbling, shake-out, and other dust-raising operations. Installation may be indoors or out, or on roof or girders.

There is no waste of water, as all sludge is dewatered in the Hydro-Clone Sludge Dewatering Tank and the water recirculated through the Hydro-Clone by the Hydro-Brasive Pump.



Sludge Dewatering Tank



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FEATURES

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☐ Please send me your new Bulletin FY-109 with information on Whiting Hydro-Clones.

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Better Cleaned Castings

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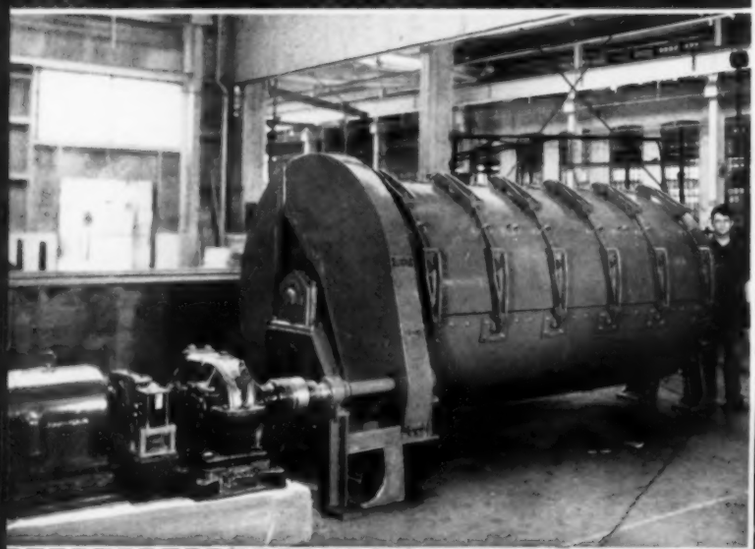
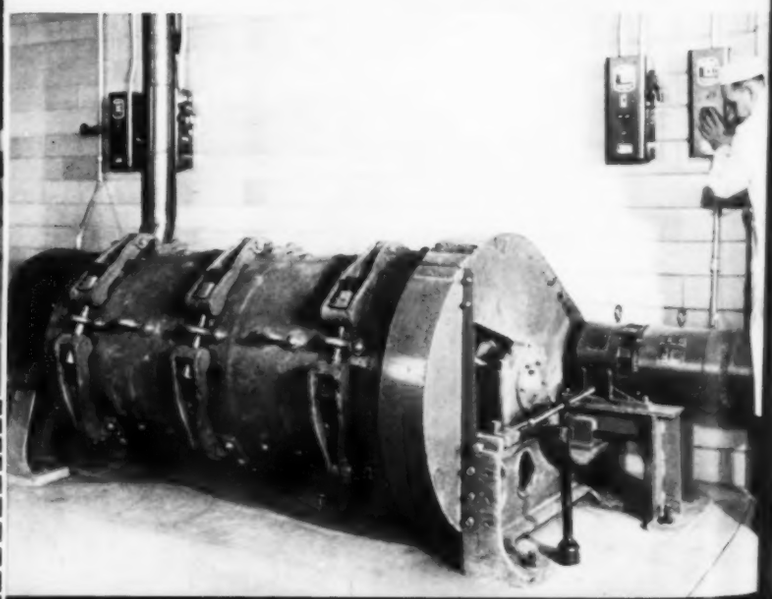


Properly cleaned castings are easier to machine . . . prolong life of tools. They are easier to paint, too, saving both time and materials. Whiting offers casting-cleaning equipment suited to every foundry requirement.

•

HYDRO-BLAST BARRELS clean medium and small brass castings to a "satin finish" with a 1200-lb. stream of water and sand. Capacities—1 to 3 tons per hour.

Exhaust TUMBLING MILLS (Dry) clean off sand and scale, leaving a good surface for machining or painting. Roller bearing construction saves power and lubricants . . . relieves gears and motors of excessive strain from starting loads. New direct-drive unit (see below) uses gear-motor with built-in solenoid brake (operated by push-button control). Drive motor is enclosed, dust-proof, and fan-cooled, requiring minimum maintenance. Wide range of standard sizes (both round and square barrel) to cover all requirements. Larger sizes equipped with separate gear reducer.



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WHITING

PIONEERS SINCE 1884

Minute Man Flag To Cooper-Bessemer

Cooper-Bessemer Corp., operating plants in Mt. Vernon, O., and Grove City, Pa., staged a house warming party for employes, their families and many invited guests at the Mt. Vernon plant, Saturday Aug. 29 from 8 to 12 p.m. The celebration marked the second major plant expansion since Jan. 1, 1942, also that the employes are enrolled 100 per cent in the War Bond purchasing drive.

In recognition of the company's effort, John W. Bricker, Governor of Ohio presented Gordon Lefebvre, general manager of the corporation with the Minute Man flag awarded by the United States Treasury Department. President B. B. Williams in introducing Governor Bricker announced that employes have pledged, not 10 per cent, but 11 per cent of their earnings to be collected under a payroll deduction plan.

Governor John W. Bricker of Ohio presents the Minute Man flag to general manager Gordon Lefebvre of the Cooper-Bessemer Corp.

In an eloquent and forceful address the governor thanked the corporation and its employes for their whole hearted and patriotic effort. Ohio, he claimed, has played a prominent part in every war in which the country was involved since the Revolution. Ranking fifth among the states in population, it ranks third in industrial production. With 1274 plants actively engaged in the production of materials and equipment needed in the present emergency, Ohio takes first place.

The celebration enlivened by music and dancing was staged in the new

Cooper-Bessemer Corp., staged a highly successful house warming party Aug. 29 to mark the opening of a new coremaking department at the Mt. Vernon plant

$300,000 addition to the Mt. Vernon foundry, completed by the Defense Plant Corp., for expanding production of castings for large compressors and engines used in the nation's war effort.

Early in the present year the 109 year old corporation completed a large addition to its diesel engine plant at Grove City, Pa.

The new foundry addition, 120 x 140

Awarded Army-Navy "E" Pennant

Ohio Injector Co., Wadsworth, O., has been awarded the Army-Navy "E" for high achievement in production of war equipment. The presentation was made by Captain R. P. Schlabach, U.S.N., and received by P. M. Arnall, executive vice president of the firm. Army-Navy "E" pins were presented to the firm's employes by Lt. A. R. Staudt, U.S.N.R., and were acknowledged on behalf of the employes by Charles Taylor.

War Production Efforts Gain Pennant

Employes of the Bridgeport, Conn., plant of Jenkins Bros. recently were awarded the new joint Army-Navy "E" pennant for excellence in war production. Photo shows Bernard J. Lee, vice president in charge of manufacturing, who has just received the pennant on behalf of the employes from Rear Admiral Wat T. Cluverius, turning it over to four of the oldest employes of the firm (left to right) Franklin A. Bennet, Katherine Kelley, Michael J. Delmar, and Elizabeth J. Mole. Seated are Farnham Yardley, president of Jenkins Bros., and Admiral Cluverius

feet to house the core making department of the foundry at Mt. Vernon has seven core ovens. Four are large enough to dry cores for huge castings going into compressors weighing up to 110,000 pounds.

A spur track along side the building delivers sand to hoppers arranged underneath. Sand is dumped from freight cars until needed when it is hoisted from the sand hoppers and put through the mixing equipment.

For the party the new building was decorated and lighted elaborately inside and out. The core ovens served as booths for refreshment and food, while the roofs were covered temporarily with seats.

Light Alloys Groups Formed by A.F.A.

Recognizing the increasing demand for aluminum and magnesium castings and the rapid growth of these divisions of the foundry industry, the American Foundrymen's Association has divided its present nonferrous division to creat a new light alloys division. The present nonferrous division interested in the production of brass, bronze and light alloy castings will become the brass and bronze division.

Men who have volunteered for service on an advisory committee to direct activities, include: Leslie Brown, plant manager, Magnesium Fabricators Division, Bohn Aluminum & Brass Corp., Adrian, Mich.; B. D. Claffey, vice president and manager, General Malleable Corp., Werra Aluminum Division, Waukesha, Wis.; Carleton C. Hitchcock, superintendent R. C. Hitchcock & Sons, Minneapolis, Minn.; W. E. Martin, metallurgist Sperry Gyroscope Co., Inc., Flushing, N. Y.; H. J. Rowe, metallurgical engineer, Aluminum Co., of America, Cleveland. A. T. Ruppe, foundry superintendent, Bendix Products Corp., South Bend, Ind.; Dr. N. E. Woldman, chief metallurgical engineer, Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J. Other outstanding members of the light alloys castings industry are being approached to serve on this committee.

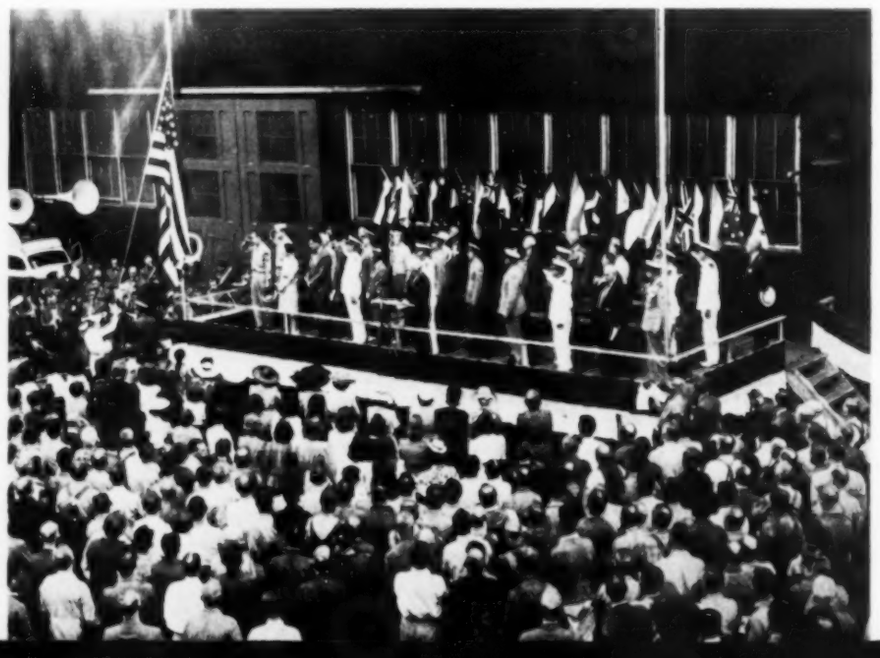
Any person interested in taking part in the activities of the new light alloys division is requested to volunteer his services to Robert E. Kennedy, secretary, American Foundrymen's Association 222 West Adams street, Chicago.

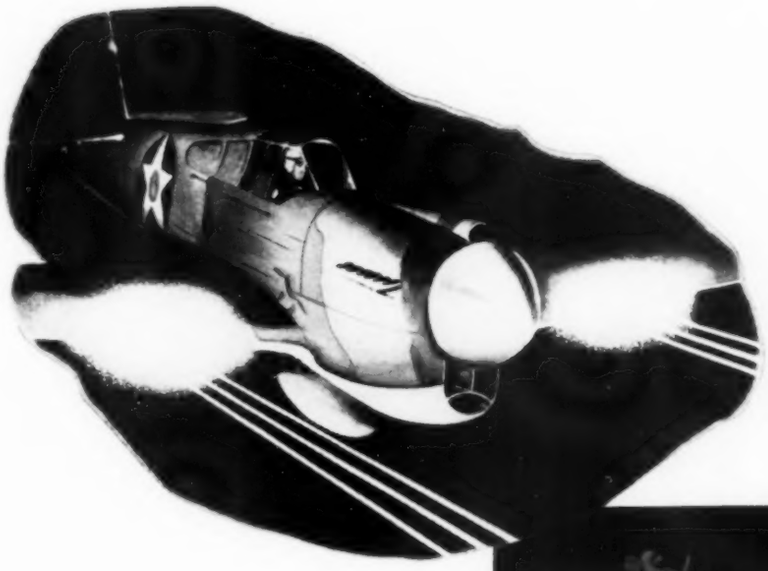
Allis-Chalmers Wins Minute Man Flag

Employes of the Allis-Chalmers Mfg. Co., Milwaukee, have subscribed enough of their pay so Uncle Sam can buy a heavy bombardment plane and a 13-ton tank each month. The company has been awarded the Minute Man flag by the United States Treasury department. At two of the company's plants, employes subscribed 100 per cent. One plant pledged 13 per cent of its gross payroll

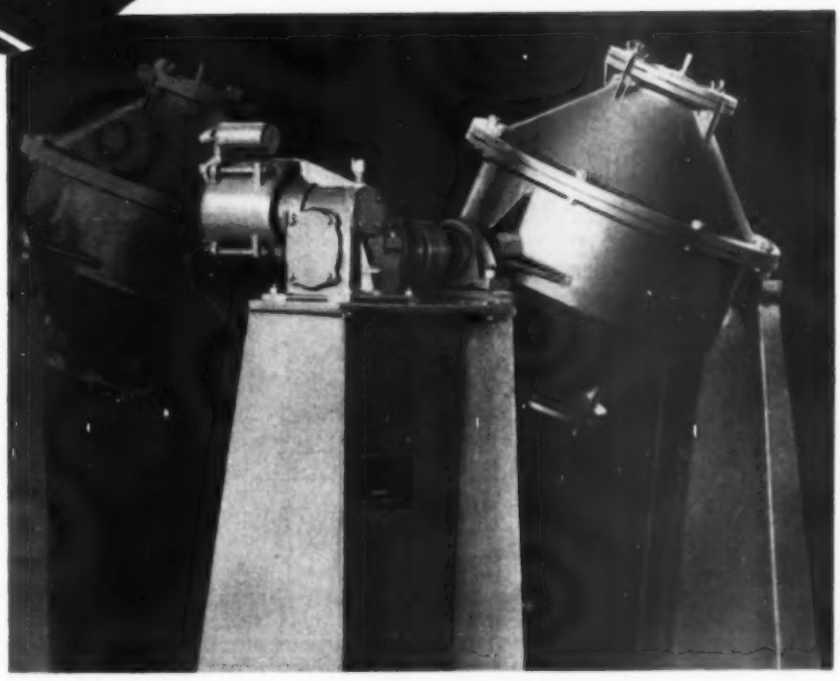
Receives Army-Navy "E" Award

Wellman Engineering Co., Cleveland, recently was awarded the Army-Navy "E" pennant for its speed and efficiency in constructing giant drydock cranes for the government. Capt. H. G. Taylor, U.S.N., Bureau of Yards and Docks, presented the flag to A. E. Gibson, president of the firm. "E" pins were presented in behalf of company employes by Capt. L. N. Moeller, Bureau of Yards and Docks to Daniel W. Edwards, a 40-year veteran, and to Miss Olive Scheer, a 31-year veteran. G. W. Burrell, chairman of the board, Wellman Engineering Co., presided at the ceremonies.





To mix tracer bullet powder···



Cast Everdur Copper-Silicon Alloy cone blender for mixing war-vital tracer bullet powder. Made by The H. K. Porter Company, Inc.

CAST *Everdur* CONE BLENDERS

Production of Everdur* for such war-vital use as this cone blender, has been vastly increased; its value for this and many other types of service is widely recognized . . . Everdur is a high strength, corrosion-resistant engineering metal—furnished in four standard copper-silicon alloys which lend themselves to fabrication by all usual methods, including welding.

The casting alloy, Everdur 1000, is supplied in 25 lb. notched ingots, and is handled efficiently and economically with regular brass and bronze foundry equipment. Everdur 1000 is a high copper alloy held to definite specification, of which the following is the nominal composition:

COPPER.....	94.90%
SILICON	4.00%
MANGANESE.....	1.10%

Our publication E-1, "Everdur Casting Ingots", contains a detailed description of physical properties and foundry practice. Copies free on request.

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PATTERN PLATES AND COPE AND DRAG BOARDS

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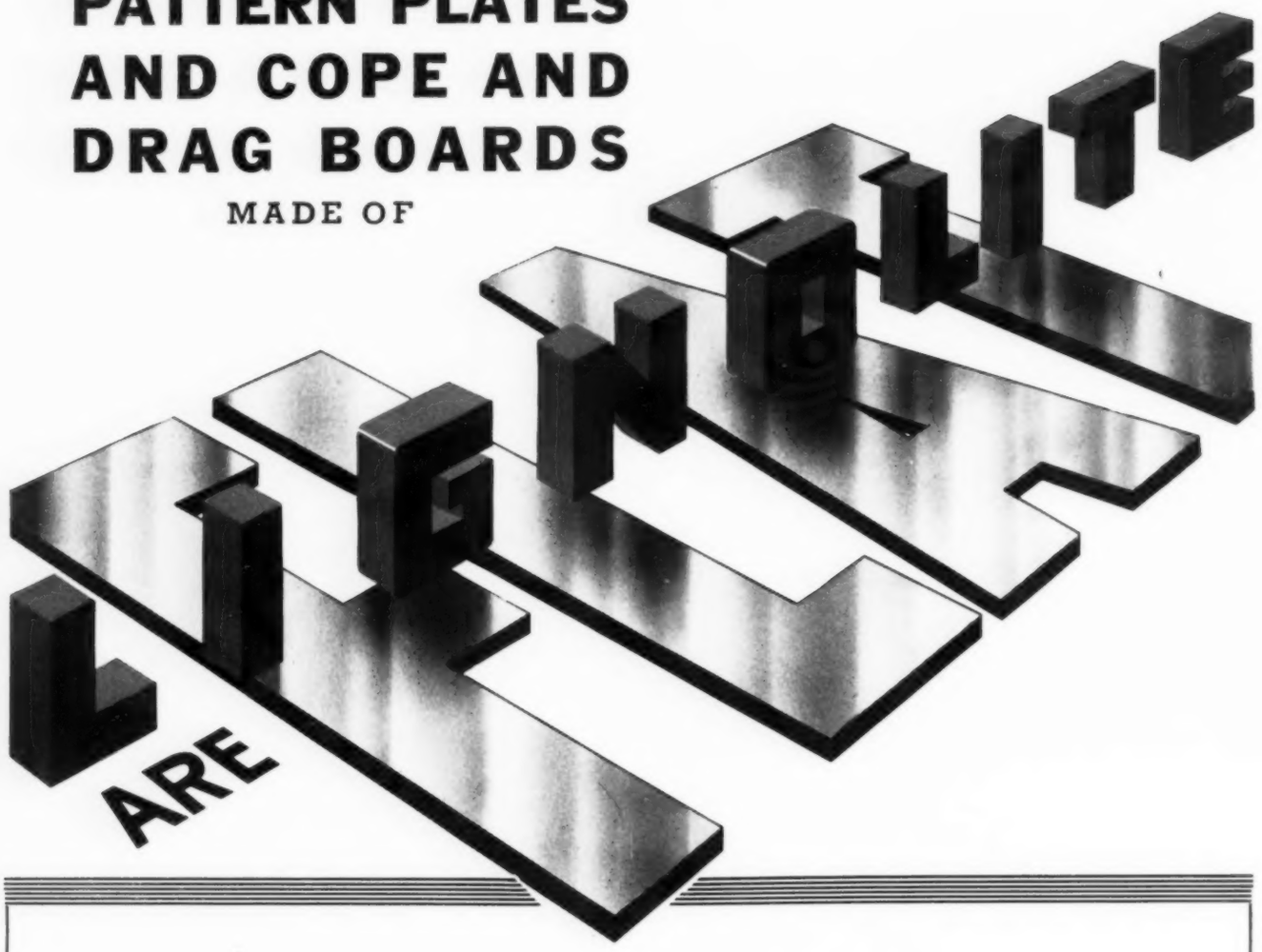

● Yes, they are flat and stay flat because LIGNOLITE has high transverse strength and resistance to deflection. It is impervious to moisture and does not warp from contact with wet sand or high humidity. This tough laminated lignin plastic is also highly resistant to oil, grease, dilute acids, etc. In addition, LIGNOLITE is half the weight of aluminum thereby combining the most desirable qualities so necessary in pattern plates and cope and drag boards: FLATNESS, LIGHT WEIGHT, and STRENGTH. This material, moreover, is abrasion proof, of uniform caliper, and may be easily machined, sawed, drilled, tapped, etc. Available in all flask sizes 7/16″ to 2″ thick or in sheets for own cutting. Please write for sample and complete information.

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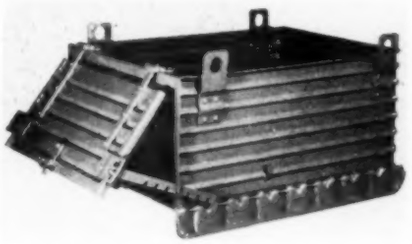
new equipment and supplies

Platform Box

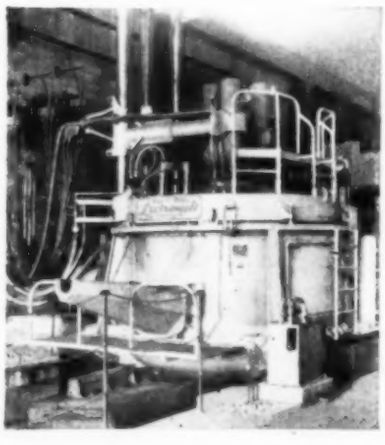
Pressed Steel Division, Truscon Steel Co., subsidiary of Republic Steel Corp., Cleveland, has placed on the market a corrugated steel box and platform unit with hinged and door for efficient handling of small castings, as shown in the accompanying illustration. The heavy gage smooth steel bottom when placed on a rack and tilted approximately 20 degrees will permit the parts to flow easily through the door opening to a table, bench or any other desired location.



The door is hung on heavy duty forged hinges reinforced and riveted in place. A slotted bar on one side holds the door in any desired position to control the flow of material. The unit may be used with fork trucks and may be equipped with tiering or crane lugs for efficient storage and handling of the boxes in the foundry or plant.

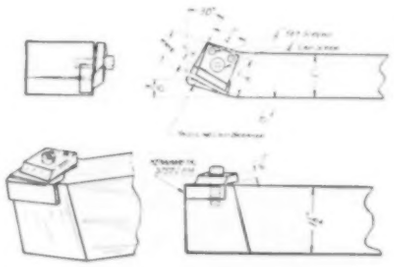
Electric Furnace

Pittsburgh Lectromelt Furnace Corp., Pittsburgh, recently has announced an improvement in design in the smaller size electric furnaces to more efficiently handle light scrap. A typical example of the change in design in the 10-ton furnace is shown in the accompanying illustration. In this size the side walls are deepened to allow an increase of 25 per cent in scrap capacity. In the 2 to 5-ton sizes the scrap capacity has been increased approximately 22 per cent. Furnaces are cylindrical in shape with spheroidal bottoms. Side walls including refractory lining average 13½ inches in thickness.



Carbide Tool Tips

McKenna Metals Co., Latrobe, Pa., has introduced a simple method for using the clamped on carbide tool tips. The tool shank is milled out and a simple clamp is attached. A conventional angular shelf type chip breaker is ground into the tip. Danger of brazing strains is eliminated and grinding is simplified. An SAE 1045 shank may serve for four successive tips.



As the tip is reground, it is moved forward and out under the clamp with shims behind. When the tip becomes too small for service in one tool, frequently it can be brazed into a smaller shank for light work.

Portable Elevator

Lewis-Shepard Sales Corp., 245 Walnut street, Watertown, Mass., has introduced a 40-foot telescopic portable elevator for use on maintenance and construction work. Specifications include: Capacity 1500 pounds; overall height 40 feet 4 inches; platform 36 x 72 inches; hoisting unit 3 horsepower, 110 volts, direct current; lifting speed 30 feet per minute; push button control; slack cable platform; locking device. The elevator can be built to meet other specifications.

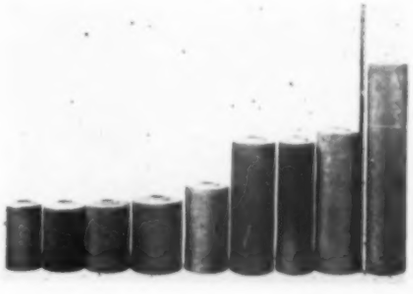
Welder's Suits

American Optical Co., Southbridge, Mass., has developed a completely new and wide assortment of high grade safety clothing designed to keep hot sparks away from usual work clothes or welder's skin. Clothing made of the highest grade chrome tanned cow hide has few seams located well away from the line of fire. All seams are double cotton stitched and reinforced with metal stitching. Coat and cape sleeves have flat seams to prevent irritation. In areas of

extra tension and strain, reinforcing rivets provide added strength. The garments are equipped with large, durable snap fasteners, easy to open and close, to stand up under hard service and insure tight closures. Closely spaced rivets reinforce pants and overalls from the inseam of the leg to the fly. Snaps placed close together prevent sparks from rolling through the opening and igniting the wearer's clothing.

Stopper Rod Sleeve

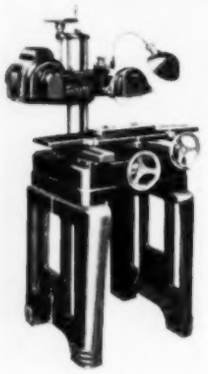
National Fireproofing Corp., 202 East Ohio Street, Pittsburgh, has developed a stopper rod sleeve, extruded through a die at high pressure in lengths as long as practical for handling in making up stopper rod assemblies in steel mill or



foundry. It is claimed the long sleeves reduce the probability of rod joint failure, and reduce the cost of labor and cementing material. Rod assemblies of long sleeve sections are obtainable at no greater cost than of their equivalent volume in ordinary short length sleeve brick. They are usually ordered as double or triple lengths of the ordinary standard sleeve used in each plant. Formation of air pockets in the clay during mining is eliminated by the deairing process which produces a material of uniform density, free from laminations and other faults. Pouring nozzles are manufactured in the same manner as the sleeves.

Surface Grinder

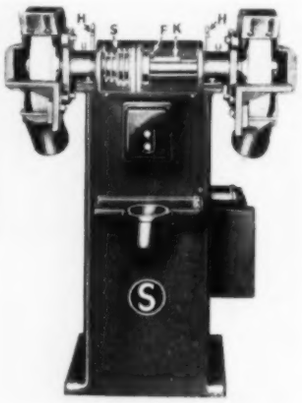
Delta Mfg. Co., Milwaukee, recently has developed a new type surface grinder for tool and production shops, as shown in the accompanying illustration. Features include a special wheel mounting arrangement that utilizes a two-piece



adapter; a carefully designed spindle, extra long with widely spaced bearings; improved table with conveniently located control handles; micrometer collar and *T*-slots; column may be rotated through 360 degrees. Machine has capacity for pieces up to 6 x 13½ inches. Maximum space under 7-inch wheel, 9½ inches. Table surface 5¾ x 13 inches. Maximum diameter wheel 7 inches. Minimum diameter cup wheel with standard guard in place, 3½ inches.

Multispeed Grinder

Standard Electrical Tool Co., 1938 West 8th Street, Cincinnati, has added a new multispeed grinder to its line which not only has the speed change construction, but has the added advantage of being able to receive wheel stubs from larger machines. A 12-inch diameter wheel may be worn down to 5 inches while the peripheral speed is maintained. The ball bearing, totally enclosed motor is mounted on an adjustable plate back of the pedestal. Power is transmitted to the spindle through a multiple v-belt drive. A push button safety starter is located conveniently in front. Hinged door type safety guards with exhaust outlet, adjustable spark breaker and work rest are constructed in accordance with American engineering standards. Interlocking arrange-



ment prevents over speeding of grinding wheels. Other multispeed grinders are available for vitrified or high speed wheels up to 30 inches diameter.

Extinguisher Box

Erie Supply & Equipment Co., 426 Huron avenue, Sandusky, O., has developed a tamper proof housing, available in various sizes for all types of fire extinguishers. Features include: All metal box, glass side windows for inspection, no glass to break by hand or instrument, no flying glass to cut hands or face, padlocked to prevent tampering, hand pressure on breaker arm breaks the lock seal and door springs open, glass seal drops into container and easily is removed and replaced, keeps extinguisher in good condition free from grease

dust and grime, long service and little upkeep and repair. It is claimed this new container is an insurance against sabotage and accident.

Valve Control

Foxboro Co., Foxboro, Mass., has designed a unit for manual control of remote valves, dampers and other pneumatically operated equipment. The new unit harmonizes with the rectangular case in which Foxboro recording and controlling instruments now are available. Flush mounted, the front surface in only 7/16-inch from the surface of the panel. Recessed setting knob and pressure indicator are not subject to accidental bumps. Specifically designed for dead end service, the unit will hold reduced pressures dependably to within narrow limits. The unit also is useful in other applications, setting control points of distant instruments, or adjustment of positioning or pressure producing pistons located in inaccessible points. It is practical for operation over distances up to 1000 feet.

Finger Guard

Industrial Gloves Co., Danville, Ill., has introduced a safety type guard for all jobs where protection is needed only on thumb and first two fingers. In the accompanying illustration the guard is shown made of wood felt, a material best

suited for handling greasy or oily parts, or as protection against heat in the handling of hot dies, parts, etc. The guard also is available in chrome leather. In both types the back is elastic webbing to assure cool, comfortable fit. The new steel grip triplex guard can be purchased as pairs, all rights, all lefts or any combination of rights and lefts.

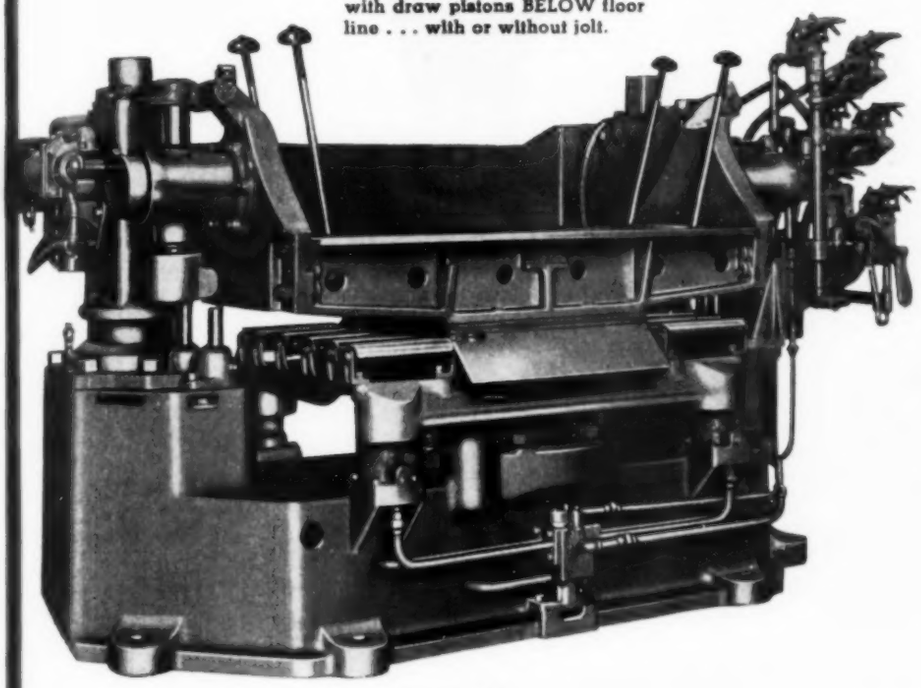
Stamp Holder

Acromark Corp., 9 Morrell Street, Elizabeth, N. J., has developed a specially constructed holder for metal stamps. Extra body gives the type sufficient strength to permit required length necessary to reach into sunken panels, or other recessed areas. The holder extends the limit and a spring pressure clip holds the type firmly in position. The type can be changed readily by simple pressure on the clip. The holder is a special alloy tool steel, tapered to fit the hand and brought to a head for easy striking.

MILWAUKEE *High Speed* ROLLOVERS

Engineered for the VICTORY DRIVE

Models B & D
with draw pistons BELOW floor line . . . with or without jolt.

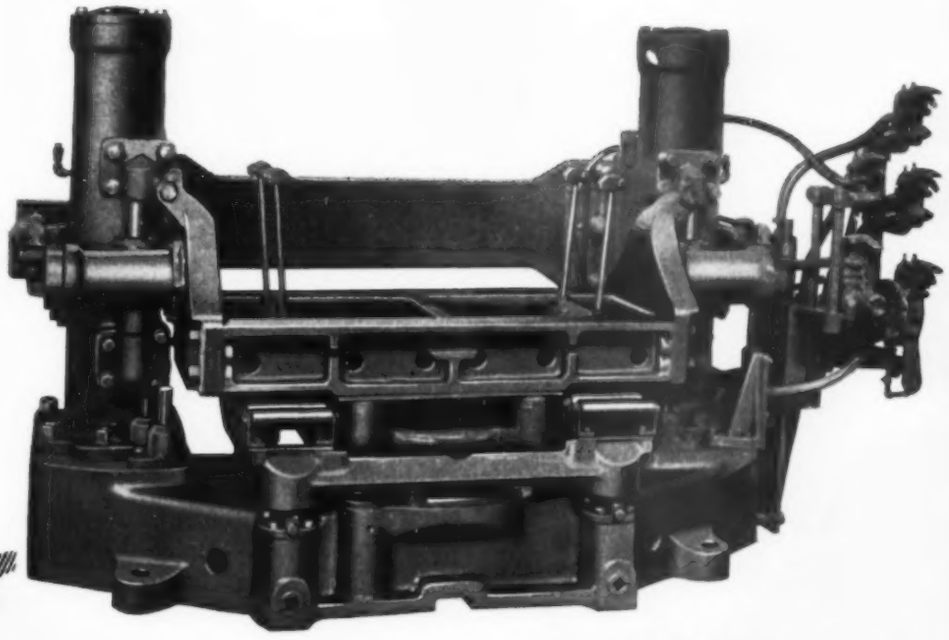


If you're really looking for PEAK production in your foundry, install one of these modern Milwaukee Jolt Rollover machines. It's designed by experienced foundrymen to meet today's vital need for greater war production. Ideal for both general molding and core making. Equipped with automatic air clamps, power rollover and instantaneous hydraulic leveling, it will solve your molding problems for the duration . . . and continue to serve you in the reconstruction period ahead.

Two models available, with draw piston ABOVE or BELOW floor line . . . with or without jolt. Write for further particulars.

Check THESE FEATURES

- ✓ Clamping is automatic.
- ✓ Rollover operation performed by simple, quick-acting pistons.
- ✓ Roll back cushioned by same pistons.
- ✓ Hydraulic leveling is instantaneous.
- ✓ Finished mold or core deposited on conveyor for ready removal.
- ✓ Absolute minimum number of parts results in lowest maintenance cost.
- ✓ Compact design — minimum floor space required.



Models A & C
with draw pistons ABOVE floor line . . . with or without jolt.

MILWAUKEE FOUNDRY EQUIPMENT CO.

3238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

Low Melting Alloy

Cerro de Pasco Copper Corp., New York, has placed on the market a low temperature melting metal for accurately proof-casting cavities such as in molds, gun chambers, forging dies, etc. The material called Cerrosafe is an alloy of bismuth, lead, tin and cadmium weighing about 0.35 pounds per cubic inch, and completely molten at 190 degrees Fahr. During solidification and cooling to room temperature, the alloy shrinks 0.0050-inch per inch, and after 1 hour at room temperature grows 0.0022-inch per inch; gradually increasing until at 500 hours the growth is 0.0050-inch per inch. The alloy also may be sprayed on wood core boxes and patterns for protective purposes.

Fire Extinguisher

Philip Carey Mfg. Co., Lockland, Cincinnati, has developed a granular product for extinguishing magnesium fires. Spread over a fire, it is claimed the material softens and seals the burning magnesium with an air tight blanket. Extensive tests are said to show that where 3 pounds of magnesium scrap were ignited and then covered with the extinguishing material, the fire was extinguished in 5 minutes, and 2 pounds, 5 ounces of metal recovered. The material may be applied to the fire with an ordinary shovel, or direct from the container. Application does not produce objectionable soot or smoke. Fumes contain no toxic gases. The material does not absorb an appreciable amount of water under normal atmospheric conditions. It flows freely at temperatures up to 175 degrees Fahr and is not adversely affected by exposure to ordinary temperatures.

Film for X-ray

Photo Products department, Du Pont Co., Wilmington, Del., has developed a new and faster, fine-grain industrial film known as type 506 fine grain. Due to added speed, the film should produce radiographs of the lighter metals with excellent detail and contrast, with much shorter exposures. Emulsion is designed specifically for use without fluorescent intensifying screens, but conventional lead screens may or may not be used. The film is said to possess good latitude and gradation also.

Standard Covers

R-S Products Corp., 4530 Germantown avenue, Philadelphia, recently has developed a complete range in types and sizes of standard covers for forming a dust and grease tight closure on bearing housings. Chief advantages are said to include low unit cost, saving of costly setups, reduction in designing, drafting, detailing and checking time, elimination of cost of fixtures, gages, etc.

Air Heater

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed an air heater for ovens or furnaces employed in annealing aluminum, glass and other materials. Designed for temperatures of 750 to 1150 degrees Fahr., the unit has a heating element, a one piece nickel-chrome ribbon, wound spirally around heavy porcelain insulators. Rating is 3 kilowatts for operation on 220 volt circuits. The complete heater is only 2½ inches thick and requires a space 12 x 33 inches for mounting.

Pump Barrel

Specialties Mfg. Co., 35 Farrand street, Bloomfield, N. J., recently has placed on the market a stirrup pump barrel and a sand barrel for use in air raid emergency. The stirrup pump barrel has a capacity of 20 gallons of water and is equipped with handles, hinged cover and a 12-foot length of hose. The assembly is mounted on wheels. The sand barrel with capacity of 2½ cubic feet and mounted in a similar manner, is equipped with a long handle shovel and an axe. The barrels are painted a bright yellow and suitably marked. They also are available in a coating of luminous paint.

Second Front Sets Plant Record

A novel production drive employed during the month of July by the Lindberg Engineering Co., Chicago, resulted in a 37 per cent increase in production over the best month to date, and in the July quota being completed 11¼ days ahead of schedule. The 'Second Front' was a 12 x 12-foot map of the English channel on which the production curve constituted the invasion path, and advanced with each day's shipments

Angle Drills

Stow Mfg. Co., Inc., Binghamton, N. Y., has introduced a line of flexible shaft units for awkward drilling jobs. Angle heads 45 and 90 degrees are easily hooked up by fitting the end of the shaft into an electric drill chuck. Standard shaft length is 30 inches. Direct angle heads without the use of flexible shaft also are available. Drill heads built for heavy duty service are gear driven, full ball bearing type and permanently attached to the shaft. Spindle heads are threaded for adapters ¼-28 thread, accommodating either stub or full length drills up to No. 30 size. Clearance distance from drill center to outer surface of angle head housing is ⅜-inch.

Insulating Cement

Building Materials Division, Armstrong Cork Co., Lancaster, Pa., is introducing a new cement for laying insulating fire brick. Advantages claimed for the new cement include improved workability, greater coverage, high degree of cold bonding strength and hot bonding strength. Coefficient of expansion of the dried cement is the same as that of the brick manufactured by the same company and therefore eliminates cracking and peeling. Without possessing the bonding characteristics of an air set

(*Concluded on page* 127)

CARL-MAYER

.... now building three large
MONORAIL CORE OVENS
for use in one of the **WORLD'S LARGEST** concerns engaged in airplane engine manufacture.

● Competition in the foundry oven field is keen but Carl-Mayer lands important orders from America's outstanding concerns.

The REASON is Carl-Mayer's ability to create the fastest, most efficient, most economical and most convenient foundry ovens of a type and size to best suit the customer's needs. Wire for a Carl-Mayer Engineer NOW!

THE CARL-MAYER CORP.
3030 Euclid Ave. Cleveland, Ohio

Three new Continuous Monorail Core Ovens similar to this for Ford Motor airplane engine plant

BAKE CORES, DRY MOLDS *with* SPEED *and* SAFETY *in*

CARL-MAYER OVENS

CORE AND MOLD OVENS, ALL TYPES, SIZES AND FUELS, SERVING CUSTOMERS LIKE THESE

ALUMINUM CO. OF AMERICA
AMERICAN MAGNESIUM CORP.
AMERICAN RADIATOR CO.
BABCOCK & WILCOX CO.
BUCYRUS-ERIE CO.
BROWN INDUSTRIES CORP.
DUNKIRK RADIATOR CO.
ECLIPSE AVIATION DIVISION OF BENDIX AVIATION CORP.
ELECTRIC AUTOLITE CO.
FORD MOTOR CO.
FOX FURNACE CO.
FORT PITT STEEL CASTING CO.
FRANK FOUNDRIES CORP.
FREMONT FOUNDRY CO.
G & C FOUNDRY CO.
GENERAL MOTORS CORP.
GENERAL ELECTRIC CO.
GILBERT & BARKER CO.
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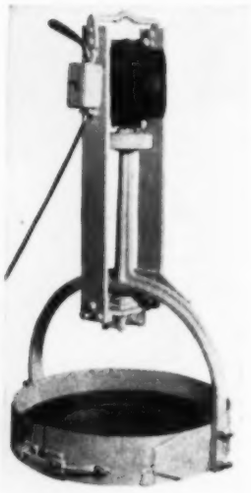
LECTROMELT STEEL CASTING CO.
OHIO INJECTOR CO.
PACKARD MOTOR CO.
SHENANGO PENN MOLD CO.
STUDEBAKER CORP.
UNION METAL & MFG. CO.
WHITEN MACHINE WORKS
WHITING CORP.

FOR WAR PRODUCTION



SPEED...

THE LOWE ELECTRIC SIFTER—The ideal foundry riddle . . . because it sifts faster than ever before; because it delivers a more aerated sand; because it's easier to load.

A new design malleable yoke has increased the sifting action which also "fluffs" the sand more. A new lower bearing design gives more shovel room, permits faster loading.

More speed and better sand means better production for users of the new Lowe Riddle. Write for details today.

"The Twist Does The Trick"

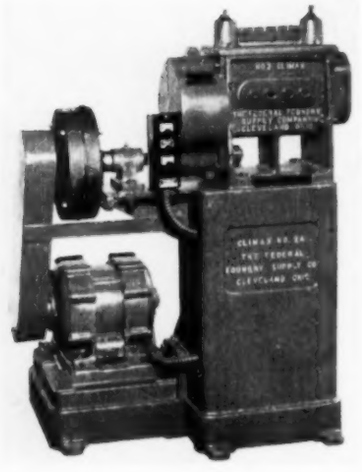
SAFETY...

FEDERAL TWISTED STEM CHAPLETS—The twisted stem is the only design that promotes fusion, plus keying action, without reducing the strength of the stem at any point.

Uniform stem thickness from head to head prevents premature burning in and allowing the core to collapse. The smooth twisted stem offers no place for gas or dirt to collect.

Solidly welded square or round heads make the Federal Twisted Stem Chaplet one solid piece.

Regardless of your type of work, you'll do it better when you switch to Federal Twisted Stem Chaplets.



SAVINGS

HE CLIMAX WIRE STRAIGHTENER—Old core wires cost a lot less than new wire and, when straightened, they become just as useful. You can save money by straightening and re-using your old wires on a Climax Wire Straightener.

The Climax comes in three sizes which handle a total range of wires from 1/16″ to 3/4″. They can be had motorized as shown or ready for your drive.

The Climax will soon pay for itself in your plant. Write for details giving us the wire sizes you use.

★ ★ ★

THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

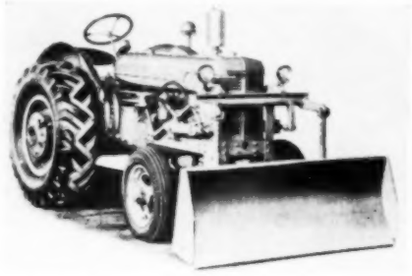
CHICAGO — CHATTANOOGA, TENN. — DETROIT — MILWAUKEE — MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

(*Concluded from page* 124)

cement, the new material provides an excellent bond of moderate strength. It is claimed that it is particularly suitable for use directly exposed to furnace temperatures over 1800 degrees Fahr. A fired bond is not attained at lower temperatures, therefore back up brick laid with the new cement readily can be salvaged with little or no loss.

Bulldozer

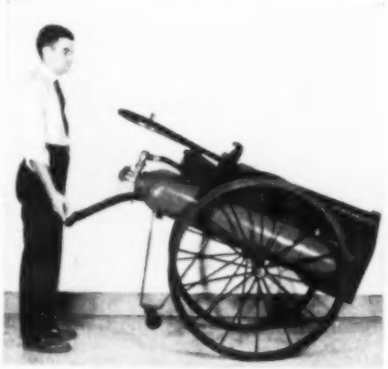
Baker Mfg. Co., 501 Stanford Avenue, Springfield, Ill., announces a new small size hydraulic bulldozer for use on light wheeled tractor which has numerous industrial applications. It is stated that the machine levels, grades, backfills, spreads refuse and, other materials, excavates and removes snow and travels from job to job at high speed. Unit is operated hydraulically. Blade cuts 6



inches deep and is raised and lowered by dual cylinders. The mold board 24 x 66 inches can be raised 12½ inches. The unit finds ready application.

Fire Engine

American-LaFrance-Foamite Corp., Elmira, N. Y., has developed a 100-pound carbon dioxide engine for use on electrical or oil fires. The engine is



equipped with an antistatic horn to protect the operator from static charge. Designed for perfect balance at wheeling height, the device has a third swivel wheel for easy manuevering and a retaining latch which releases horn instantly, yet holds it firmly in place when not in use. The engine is recommended for fires in flammable liquids, alcohol storage, electrical machinery and for other class *B* and *C* fires. The engine functions by smothering fire instantly with carbon dioxide gas which expands upon discharge to 450 times its stored volume. The gas is noncorrosive, nonpoisonous and odorless.

Low Temperatures Used in Welding Gray Iron Castings

By R. D. WASSERMAN
Eutectic Welding Alloys
New York

A RECENT development which is attracting considerable attention is the low-temperature welding of gray iron and other ferrous alloys. It is being employed in a number of foundries for the reclamation of defective castings. The process is accomplished with little or no preheating, using a special ferrous alloy rod which is applied with either oxy-acetylene or arc welding.

The procedure followed is to grind or chip off the surface at the defective portion to remove scale, oxide and sand. That practice has been found satisfactory at least on the surface of sections 3/16-inch thick and over ½-inch square. The part to be welded then is preheated slightly by circular movement of the acetylene torch for a few minutes, depending on the thickness of the part.

During heating a special flux in paste form is applied to the surface. As soon as the temperature of the piece reaches a dull red, approximately 950 degrees Fahr., the alloy rod, marketed under the trade name Castolin No. 14, is placed in front of the torch. The material in the rod will flow ahead of the torch on the heated surface without fusion of the parent metal. The cast iron alloy is said to form an excellent bond with the base metal at temperatures between 950 to 1400 degrees Fahr. Micrographs indicate that clearly, and the strength of the weld is claimed not only comparable to, but even higher than that produced by other procedures as has been determined by numerous comparative tests that have been conducted.

As might be expected the low temperature welding process permits reclamation with little or no distortion. Some foundries have found that with castings of complicated design, the preheating could be reduced to 300 to 500 degrees, or at the highest 800 degrees Fahr., and successful welds produced. Another

Fig. 2—Small castings welded by the low temperature process as indicated by the white lines

advantage for the process is claimed to be machinability since no hard fusion line occurs, and machining may be accomplished without any difficulty at the same rate of speed as for the rest of the casting.

As previously mentioned the welding rods used are a ferrous base, and by selection of the proper rod, the color of the weld can be made to match that of the casting. Rods are available to match the color of gray cast iron, alloy cast iron, malleable cast iron and cast steel. That feature is of value where surface appearance is a factor.

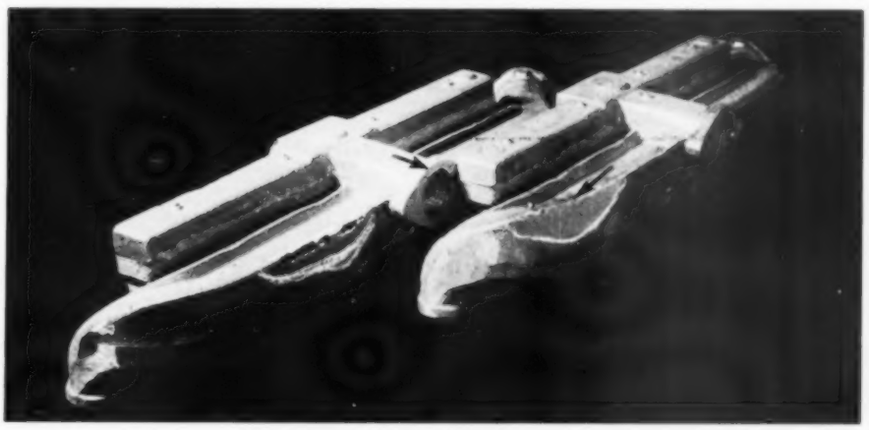


Fig. 1—Cast iron engine manifolds reclaimed by welding. The one at the left shows one defect welded and the other ready for welding while that on the right has been welded and ready for machining

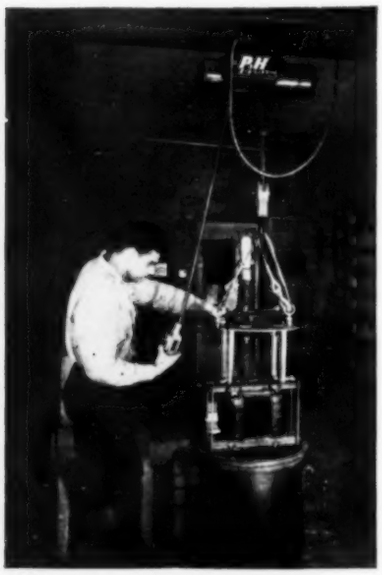
Wet Tool Grinder

Hammond Machinery Builders Inc., 1605 Douglas avenue, Kalamazoo, Mich., has a newly designed 20-inch wet tool grinder, incorporating in heavy streamlined construction all recent develop-

ments for grinding hard metals, alloys and tungsten carbide. The tool rest with replaceable steel wearing plate is adjustable and the wheel dresser is an integral part of the assembly. Other features include a circulating coolant system and detachable splash guard. The 3-horsepower fan cooled motor with push button starter is located in the base. The heavy cast wheel hood with hinged cover facilitates wheel changes. The wheel is dismounted by removing a nut and four allen cap screws.

One Ton Hoist

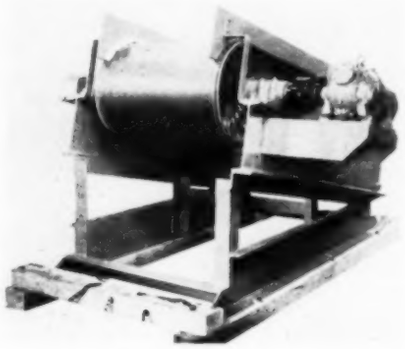
Harnischefeger Corp., Milwaukee, recently has added the 1-ton capacity lift to the regular production line. Heretofore this model was available only on special order. The hoist, shown in the



accompanying illustration, is equipped with all the advantageous features of the 250,000 and 1000 pounds capacity models, including full magnetic push button control, preformed nonspinning hoist cables, 3-way interchangeable mountings, safety type limit switch, double brakes, dust and weather proof fully enclosed construction.

Magnetic Pulley

Dings Magnetic Separator Co., 509 East Smith Street, Milwaukee, has introduced a new model high intensity magnetic pulley type separator for the reclamation of steel and iron from foundry and steel mill dumps. The unit, shown in the accompanying illustration, incorporates a high intensity magnetic pulley of serrated, air cooled construction. Four poles extend around the circumference and the magnet coils are wound between. Heavy bronze covers protect the coils.

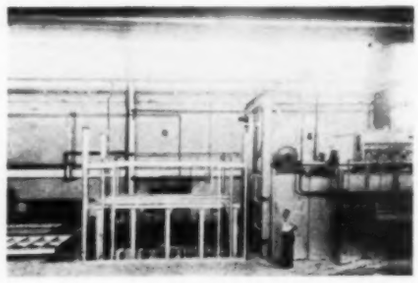


Bronze eliminates short circuiting of magnetic lines of force. This exclusive feature greatly increases the strength of the magnetic pulley and the capacity and intensity of the unit. The pulley is installed in a rugged structural steel frame. Lips on either end of the frame facilitate dragging the unit to various scenes of operation behind a tractor.

Furnace

A new heat treating furnace for aluminum and magnesium alloys, designed and constructed by the Despatch Oven Co., Minneapolis, is capable of quenching 8000 pounds of castings in 25 seconds. The furnace, shown in the accompanying illustration, is a radiant tube, convection type with indirect gas heater. Heat flow from side ducts is both vertical and horizontal, and passes out through recirculating ducts. Work chamber is claimed to be maintained within plus or minus 5 degrees Fahr. with automatic temperature control. Fan is alloy steel with a capacity of 20,000 cubic feet per minute. Strip chart, recording controller is standard equipment.

Rapid quenching feature of the furnace is said to lie in the material handling system. Series of rollers are mounted in the loading section, on top and interior of the elevator quench cage, and on the bottom of the work chamber. Those are aligned carefully to form a level roadway from loading section to furnace whether the quench cage is up or down. In operation the processed load is withdrawn from the furnace on to the elevator cage by an air winch, and then dropped quickly into the quench-



ing tank. The load waiting for heat treatment is pulled directly into the furnace, passing over the quench bath on the rollers on the top of the cage.

Drill Extension

Stow Mfg. Co., Binghampton, N. Y., recently has placed on the market flexible shaft drill extensions, as shown in the accompanying illustration, equipped with 45 and 90 degree angle heads and also with straight spindle. All heads are attached permanently to the shaft. It is claimed the drill shaft fits into the drill chuck and makes an extension that bends around corners, gets into close quarters, works where a regular drill

cannot reach. Shaft is available in standard lengths 18, 30, 36 and 48 inches.

Siren

Breurer Electric Mfg. Co., 5100 Ravenswood avenue, Chicago, has introduced an industrial air raid siren. It is available in two models, one for small departments, offices, laboratories, stock rooms, etc., and a larger size for manufacturing areas which it is claimed definitely will be heard above the usual din of machinery. Either siren is equipped with universal motor for either alternating or direct current. They operate from any ordinary light current and thus are effective at any time day or night. Each siren is equipped with base for either vertical or horizontal mounting.

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MALLEABLE

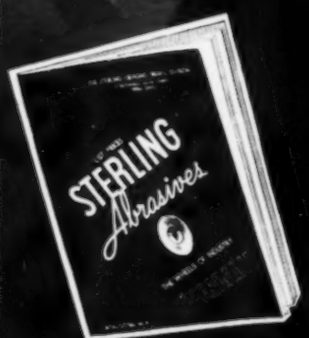
CHILLED IRON

IT is a Sterling Grinding Wheel! It has been built for your particular purpose. It's grain, bond, size, structure - all have been carefully planned by Sterling engineers to do your job faster and better. This wheel is constructed to give long service. It will run cool. It handles easily - that is why operators like to use it. It is economical - that is why foremen choose it. In short, it is a Sterling Grinding Wheel!

Designing such a wheel for hundreds of different foundry grinding jobs has been our aim for many, many years. Back of the "Wheels of Industry" are hundreds of years of experience of men who have made better-than-usual grinding wheels. These men have gone into foundries, taken a grinding problem and quickly solved it. Result - castings are moving along faster . . records are being broken! This experience can be yours at no obligation.

Send today for a Sterling engineer. Regardless of the kind of wheels you may now be using, he will gladly recommend any necessary change to help you get more out of them. If your casting grinding job calls for special wheels, he knows what to suggest to snap up your production, lessen operator fatigue, and turn out better finished castings in shorter time.

It is being done in many foundries . . may we do it in yours?



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THE WHEELS OF INDUSTRY

activities of foundry groups

New England

NEARLY 100 members and guests were present at the opening meeting of the season of the New England Foundrymens' Association, held at the Engineer's Club, Boston, Sept. 9. Dr. J. A. Ridderhof, director of research, Frederic B. Stevens Inc., Detroit, was the principal speaker, and his talk was entitled, "Use and Action of Core and Mold Coatings". The speaker outlined the composition of core and mold coatings and described the heat resistance of graphite and the refractory properties of the high fusion point noncarbon minerals. Binders for adherence and colloidal clay for suspension were covered in detail with a comparison of their effect in water and in volatile liquids which are used for vehicles or carriers of the coating materials.

Dr. Riddehof suggested procedures in preparing and controlling core and mold coating solutions. Methods of application to cores and molds of various sizes were presented and several types of drying practice were outlined. Nature and action of coatings were described and causes and corrections of certain casting defects were discussed. The speaker also suggested specific coatings for special applications. Dr. Ridderhof stressed the importance of standardization, accurate control and good housekeeping to obtain best results—*Merton A. Hosmer.*

Detroit

THE Detroit Chapter of A.F.A., has appointed a war products advisory committee to be available for consulting service on all problems relating to casting steel, malleable, gray iron, brass, aluminum and magnesium. The committee is headed by Fred A. Melmoth, Detroit Steel Casting Co., Detroit, who also is chairman of the chapter. Consultants on steel are: R. J. Wilcox, Michigan Steel Casting Co., and Ernest Lancashire, Detroit Steel Casting Co.; on malleable iron, Carl Joseph, Saginaw Malleable Iron Division, General Motors Corp., and G. L. Galmish, Michigan Malleable Iron Co.; on gray iron, V. A. Crosby, Climax Molybdenum Co., and L. W. Thayer, Cadillac Motor Car Division, General Motors Corp.; on brass and bronze, J. P. Carritte Jr., True Alloys Inc.; and on aluminum and magnesium, M. E. Brooks, Dow Chemical Co., Dowmetal Foundry.—*A. H. Allen, secretary.*

Metropolitan

A WAR problems committee has been organized by the Metropolitan Chapter of the A.F.A. at the suggestion of the parent organization, to assist manufacturers, foundrymen, and representatives of the government with technical problems upon foundry products, by making available upon application the information and experience of members of the chapter.

James S. Vanick, International Nickel

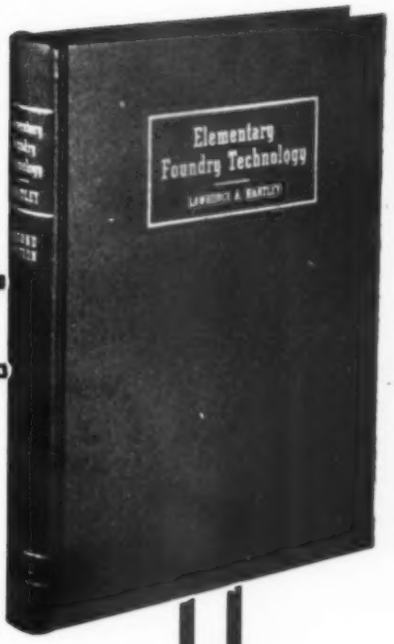
(*Concluded on page* 132)

Left—Officers and directors of the recently organized Eastern Canada-Newfoundland Chapter of the A.F.A. Below—More than 80 enthusiastic members attended the organization meeting held at the Queens hotel, Montreal

Now Ready!

Revised, Third Edition

"ELEMENTARY FOUNDRY TECHNOLOGY"



★ Revised and brought up-to-date with a completely new chapter on malleable cast iron foundry practice, the Third Edition of "Elementary Foundry Technology" will soon be ready for distribution.

Fundamental data on both foundry practices and those related subjects of importance to foundrymen are thoroughly covered for use of apprentices and young men studying modern foundry operation and management.

This book contains material conforming to the requirements for instruction as set up in the minimum standards of four year foundry apprenticeship in the United States. It is sponsored by the National Founders Association, Chicago.

In addition to the completely new chapter on malleable cast iron foundry practice, the chapter on pig iron is revised to make it conversant with present day practice. Additional references are included.

Well over half of the book is devoted to discussion of fundamentals of foundry practice, with special reference to the field of gray iron and steel manufacture. Foundry subjects covered include . . . Elements of Iron . . . Iron Manufacture . . . The Cupola and Its Operation . . . Elementary Problems in Steel Foundry Production . . . Brass Melting . . . Foundry Sands . . . Gates and Risers . . . Molding Machines . . . Core Machines . . . Long Life Molds . . . Malleable cast iron foundry practice.

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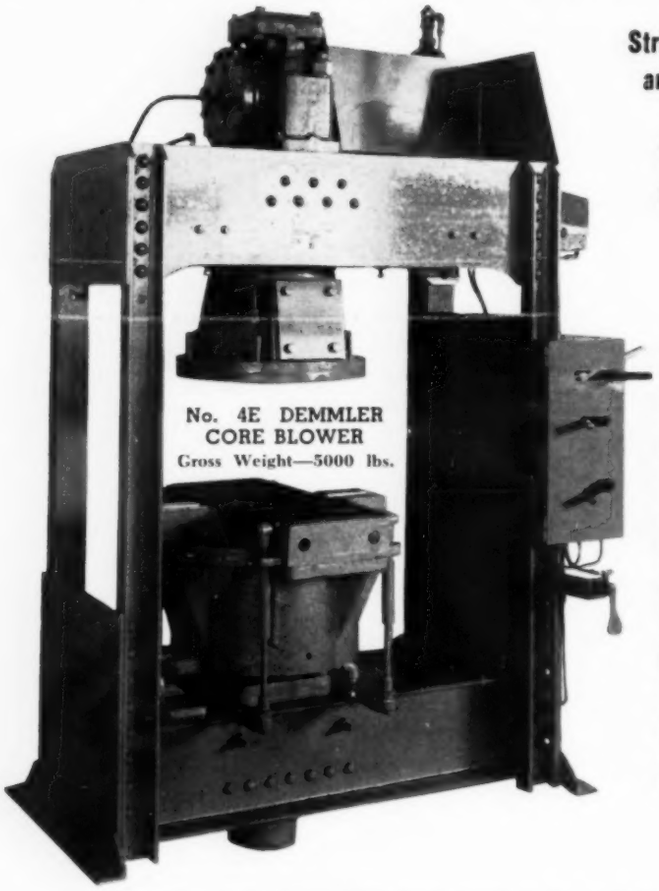
"Elementary Foundry Technology", by L. A. Hartley; Third Edition revised by Edwin Bremer and Pat Dwyer; 377 pages; 6 x 9 inches; 132 illustrations, 16 tables; includes glossary, index and bibliography; sponsored by the National Founders Association, Chicago; Price $3.00, postpaid; Published by The Penton Publishing Co., Cleveland.

(*Concluded from page 130*)

Co., New York, heads the committee. Other members are: R. E. Ward, Bendix Aviation Corp., Bendix, N. J., whose activities will center on problems relating to production, properties and specifications of aluminum, magnesium and light metal castings; K. V. Wheeler, American Steel Castings Co., Newark, N. J., steel castings; D. E. Broggi, Neptune Meter Co., Long Island City, N. Y. and S. Frankel, H. Kramer & Co., New York, brass and nonferrous castings; M. N. Anderson, Debevoise-Anderson Co., New York, pig iron; H. A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J. and Don J. Reese, International Nickel Co., New York, cupola practice and foundry equipment; R. J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J., production of pressure castings; W. T. Dette, Robins Conveying Belt Co., Passaic, N. J., gating and risering small castings; W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J., core sand and refractories; and N. A. Kahn, United States Navy Yard, Brooklyn, N. Y., interpretation of government specifications.—*B. K. Price.*

Definition of steel castings in revised price schedule No. 41 was changed by OPA to make it clear that it covers both rough and machined castings.

Announcing . . . **NEW HEAVY-DUTY BLOWER FOR MOTOR CASTINGS WORK**



No. 4E DEMMLER CORE BLOWER
Gross Weight—5000 lbs.

Strictly for BIG Cores and Fast Production

Takes Core Box up to 18″ x 24″

Designed as a special blower for a leading producer of airplane motor castings, this unit is now offered as a standard Demmler blower. Features include an accurate hydraulic core box draw table equipped with Timken rollers. 12″ diameter throat opening, control mechanism totally enclosed. The height of the frame may be adapted to varying sizes of core boxes.

Reports on this new machine from users indicate that it has unusual possibilities in production of aircraft, tank and truck motor castings. At the present time we can make good deliveries, and invite your inquiries.

WM. DEMMLER & BROS. · KEWANEE, ILLINOIS

DEMMLER

CORE BLOWERS *Exclusively*

Western New York

A WAR board has been organized by the Western New York Chapter of the A.F.A. to assist its members with any war problems that may come up. The committee was appointed by the chapter's chairman, Ralph T. Rycroft, Jewell Alloy & Malleable Co., Buffalo and includes the following: Chairman, William S. Miller, C. C. Kawin Co.; gray iron, Alex Rankin, Lake Erie Engineering Corp., Martin W. Pohlman, Pohlman Foundry Co.; malleable iron, John W. Considine, Jewell Alloy & Malleable Co., Fred Wurscher, Acme Steel & Malleable Iron Works; steel, James P. Begley, Pratt & Letchworth Co., Joseph Sanders, American Radiator & Standard Sanitary Corp.; nonferrous, John C. McCallum, McCallum Hatch Bronze Co., Harold R. King, Metal & Alloy Specialties Co.—*J. R. Wark, secretary.*

War Bond Buyers Given Awards

The United States Treasury Department recently published the list of companies who, on or before Aug. 15, had been awarded the Minute Man Flag for having 90 per cent or more of their employes pledging 10 per cent or more of their pay for the purchase of war bonds under the payroll savings plan.

Included in the list are the following foundries and organizations affiliated with the foundry industry:

Stockham Pipe Fittings Co., Birmingham
General Electric Co., Ontario, Calif.
Beardsley & Piper Co., Chicago
Francis & Nygren Foundry Co., Chicago
Pyle-National Co., Chicago
Stewart Warner Corp., Chicago
Indianapolis Stove Co., Indianapolis
Service Foundry Inc., New Orleans
General Electric Co., Pittsfield, Mass.
Warren Pipe Co. of Mass., Everett, Mass.
Buhr Machine Tool Co., Ann Arbor, Mich.
American Hoist & Derrick Co., St. Paul
Northern Pump Co., Minneapolis
Adirondack Foundries & Steel Inc., Watervliet, N. Y.
General Electric Co., Schenectady, N. Y.
American Mono-Rail Co., Cleveland
James B. Clow & Sons Co., Coshocton, O.
Hamilton Foundry & Machine Co., Hamilton, O.
Hickman, Williams & Co., Cincinnati
Hobart Mfg. Co., Troy, O.
Motor Patterns Co., Cleveland
National Supply Co., Springfield, O.
North American Mfg. Co., Cleveland
Westinghouse Electric & Mfg. Co., Trafford, Pa.
Muskogee Iron Works, Muskogee, Okla.
Electric Steel Foundry, Portland, Ore.
American Chain & Cable Co., York, Pa.
Continental Roll & Steel Foundry Co., Pittsburgh
General Electric Co., Erie, Pa.
General Steel Castings Corp., Eddystone, Pa.
International Correspondence Schools, Scranton, Pa.
Lancaster Malleable Casting Co., Lancaster, Pa.
Sun Shipbuilding & Drydock Co., Chester, Pa.
Weatherley Foundry Co., Weatherley, Pa.
Westinghouse Electric & Mfg. Co., Pittsburgh
Wilmot Engineering Co., White Haven, Pa.
York Safe & Lock Co., York, Pa.
Allen Mfg. Co., Nashville, Tenn.
Lincoln Iron Works, Rutland, Vt.
Kirsh Foundry Inc., Beaver Dam, Wis.
Van Brunt Mfg. Co., Horicon, Wis.

Obituary

CARL C. GIBBS, 60, president, National Malleable & Steel Castings Co., Cleveland, died Sept. 9 at his home in Shaker Heights, O. Mr. Gibbs had been connected with the National Malleable company for his entire business career. He was born in Rush county, Indiana, in 1882 and received his education in the public schools of Indianapolis. In 1906 he obtained employment with the National Malleable & Steel Castings Co., Indianapolis as junior clerk, serving in that capacity until 1910. From 1910 to 1919 he acted as salesman for the company. He then became sales manager of the Cleveland plant for one year, returning to Indianapolis as plant manager, a position which he held until 1928 when he returned to Cleveland as assistant to the president. He was elected president of the company in 1934. Mr. Gibbs was a member and had served as director of the American Foundrymen's Association, and was a member of the Steel Founders' Society of America, the Malleable Iron Research Institute, and many other organizations. He was assistant chief of the Cleveland district ordnance advisory board.

° ° °

Edward John Leiser, 59, superintendent of the Milwaukee works, International Harvester Co., died Sept. 2.

° ° °

Joseph T. Nieten, 58, molder, Indianapolis Stove Co., Indianapolis, died at his home in that city following an illness of 9 months.

° ° °

Harold C. Ryder, advertising and sales promotion manager, Hayward Co., New York, died Aug. 15. Mr. Ryder had been connected with the Hayward Co. since 1907.

° ° °

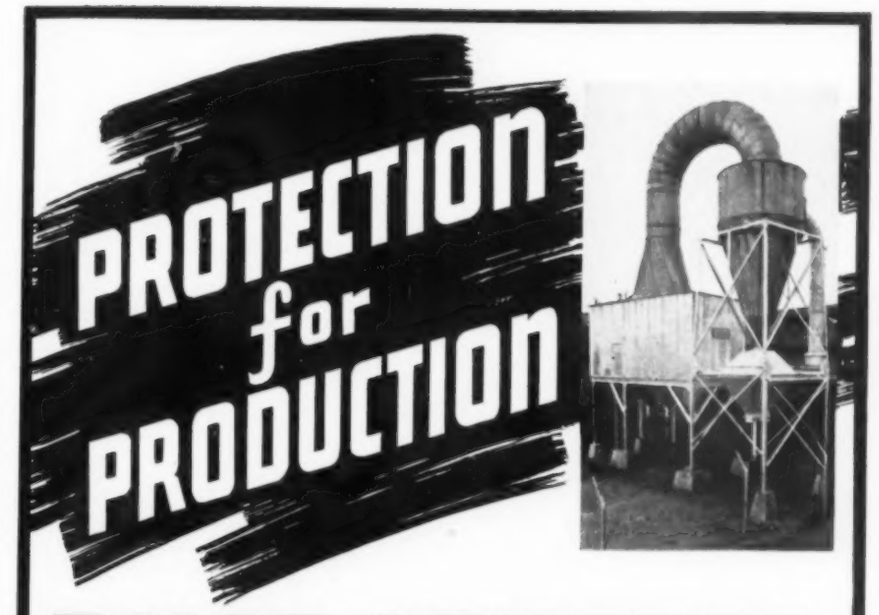
Edwin L. Smalley, 65, president, Hevi Duty Electric Co., Milwaukee, died in Milwaukee Aug. 29. Mr. Smalley was a pioneer in the electric heat treating furnace industry, and held a number of furnace patents.

° ° °

Orra L. Hollister, 79, one of the founders and president, Federal Malleable Co., West Allis, Wis., died in Milwaukee, Aug. 14. Mr. Hollister had devoted more than half a century to the malleable industry.

° ° °

Henry J. Anderson, 72, vice president, Specialty Brass Co., Kenosha, Wis., died Aug. 10 in Kenosha. Mr. Anderson became associated with his brothers in the establishment of the Anderson Bros. Foundry in 1907, and in 1912 when the



DUST CONTROL

PRODUCTION is the watchword in the battle against time. Our country has set the pace and is making her call. A call for speed and more speed. A call for efficiency and uniformity. A call for all-out PRODUCTION.

The answers are coming from far and wide. The answers to her call are coming from thousands of plants—geared to war PRODUCTION—doing a better job than ever before.

PROTECTION against the ravages of dust, grime, soot is an integral part of those plants which are "coming through". They know that to care for what they have is of prime importance these days.

Check-up on *your* plant! Are you PROTECTING what you have? Are your products, machines, employees safeguarded by a system of DUST CONTROL?

We can provide that PROTECTION for your plant. You can answer that call!

Write us today and remember that, to keep up PRODUCTION, you must PROTECT what you have!

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

company incorporated and organized the Specialty Brass Co., he was elected vice president.

° ° °

Harold Clark, assistant treasurer, assistant secretary, and personnel director, International Nickel Co. Inc., New York, died Aug. 25 at his home in Westfield, N. J. Mr. Clark had been associated with the metal industry for many years, starting in 1919 as registrar to the Mond Nickel Co. Ltd., London, England. In 1930 he was transferred to the New York office, International Nickel Co. taking the position of assistant treasurer, later being elected assistant treasurer and assistant secretary, and in 1941 he was appointed manager of personnel. Mr. Clark also was assistant treasurer and assistant secretary of the International Nickel Co. of Canada Ltd., and the Whitehead Metal Products Co., a subsidiary of the International Nickel Co.

° ° °

Prof. Raymond H. Danforth, 64, since 1914 head of the department of mechanics and materials, Case School of Applied Science, Cleveland, died in Cleveland, Aug. 30. Prof. Danforth was a member of the A.S.M.E. and the A.S.T.M.

° ° °

Joseph Frederick Froggett, senior editor of THE FOUNDRY, and its affiliated Penton Publications, *Daily Metal Trade*, *Steel*, *Machine Design* and *New Equipment Digest*, died in St. Luke's hospital, Cleveland, Friday, Sept. 11. He was 72 years old. Mr. Froggett, known widely

Joseph F. Froggett

in the steel and metalworking industries, was born in Youngstown in 1870. He learned much about the early history of the steel industry from his father, a blast furnace operator, and at the time of his death few individuals had more background information about the industry. He joined the *Youngstown Telegram* as a reporter in 1890, later becoming managing editor. In 1906, he became associated with the *Cleveland Plain Dealer* and on Jan. 6, 1908 became associated with the Penton Publishing Co., as assistant to George Smart, then editor of *Iron Trade Review*, now *Steel*. When the daily edition of the *Review* was inaugurated in 1909, he devoted considerable time to it. Later the daily edition was enlarged and renamed *Daily Iron Trade Review* and Mr. Froggett was made managing editor. He subsequently became editor of *Daily Iron Trade Review* and its successor, *Daily Metal Trade*. In 1925, he was made senior editor of Penton Publications.

In 1929 Mr. Froggett was a member of the group of American foundrymen who attended the International Foundry Congress held in London, England.

° ° °

Arthur E. Painter, 50, for the past 10 years head of the New York office of the Atlantic Steel Castings Co., Chester, Pa., died Aug. 14. Mr. Painter had long been associated with the steel casting industry, having been connected with

Castings on the move

Whisk them through the Foundry;
Zip them through the Cleaning Room.

Use the following to shorten long jobs and eliminate unnecessary ones.

LION BINDER - A strong, fast drying paste; tie wires not needed. A strong binder that bakes very fast.

EASY CLEANER CORE COMPOUND - Makes cores that clean out of the castings readily.

VULCAN BLACKING - Can be adapted to swift application; gives good surface, cleans speedily.

DUST-ON FACING - Shake it on green sand molds, close and pour. No tooling. Fast cleaning.

SUPERIOR PLUMBAGO - Rubs in immediately; doesn't "lift" the sand - - peels beautifully.

SILKOTE - Paint or spray on steel foundry cores, dry sand molds and skin dried work. Adaptable to fast application. Casting surfaces are really clean.

Manufactured only by

J. S. McCORMICK CO.
PITTSBURGH, PA.
FOUNDRY FACINGS · SUPPLIES · EQUIPMENT

the Reading Steel Castings Co., Reading, Pa., Bayonne Steel Castings Co., Bayonne, N. J.; and the Riverside Steel Castings Co., Harrison, N. J.

* * *

John S. Fowler, secretary and director, Pacific Brass Foundry of San Francisco, Inc., San Francisco, died Aug. 24, after a short illness. Mr. Fowler joined the company in 1921, and after the death of his father, Edward J. Fowler, founder of the company, in 1927, became chief metallurgist and supervised the metallurgical department until his death. He was an active member in the Northern California Foundrymen's Institute, American Society for Metals and the American Foundrymen's Association.

Adventures of Bill

(*Concluded from page* 106)

tending over these openings. With six gates ¼ x 3 inches over each side, the mold can be filled rapidly and uniformly with only about 180 pounds of metal flowing through each gate.

"With the cores in place in the mold, four rails are laid longitudinally on top and clamped to the flask. A runner basin wood block 2 inches thick, 5 inches high and about 6 feet in length is placed over the gate openings. Sand is packed between the block and the rails on either side. The block then is removed. This arrangement is for two ladles, one at each end of the mold. If a single ladle is preferable, a short runner box may be adjusted over the rails at one end and arranged to deliver metal to both long basins."

Opens New Plant

Fisher Furnace Co., Chicago, recently has opened a new plant at 5535 North Wolcott avenue, Chicago, to be operated in conjunction with its present plant at 1740 North Kolmar avenue, Chicago. The new addition increases the floor space of the company approximately 150 per cent, and provides modern manufacturing facilities. The company manufactures nonferrous melting, holding and alloying furnaces and other foundry equipment.

American Welding Society, 33 West Thirty-ninth street, New York, recently has published two welding standards on "Standard Methods for Mechanical Testing of Welds", and "Definitions of Welding Terms and Master Chart of Welding Processes". Copies of the bulletins may be obtained from the society for 40 cents each.

INCREASE
WAR PRODUCTION
WITH "MECHANIZED" HANDLING
Put STANDARD CONVEYORS TO WORK!
Get more production every hour of the day or night shift . . . provide a smooth, uninterrupted flow of materials and parts to men and machines . . . keep products moving through assembly and packaging operations without halt . . . be sure of dependable plant transportation with Standard Gravity and Power Conveyors. Hundreds of manufacturers—in both war and peacetime production—have found that Standard Conveyors gain added production hours—help substantially to accomplish more every working day.
Send for 80-page "STANDARD" Booklet
Fully illustrated—shows all types of Standard power and gravity conveyors for product and "package" handling—except bulk. Interesting and informative, you will find it a handy reference book on conveying methods.
Write for Bulletin F-10
STANDARD CONVEYOR COMPANY
General Offices
NORTH ST. PAUL, MINN.
Sales and Services in All Principal Cities
POWER AND GRAVITY
Standard CONVEYORS
FIRST FOR FASTER PRODUCTION

READER'S COMMENT

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Constructive Service

TO THE EDITORS:

Permit me on behalf of the Foundry Equipment Manufacturers Association to extend to you and your organization, heartiest congratulations upon your Golden anniversary.

Fifty years of constructive service to a basic industry is a decidedly worth while achievement and we in the equipment industry appreciate the helpful assistance rendered us by your organization over the years.

With best wishes to you and your associates for continued success and with warm personal regards to THE FOUNDRY family, I am

ARTHUR J. TUSCANY
Executive Secretary
Foundry Equipment Manufacturers' Association Inc.
Cleveland.

Fifty Years

THE GRAY IRON FOUNDERS' SOCIETY EXTENDS TO THE FOUNDRY HEARTIEST CONGRATULATIONS UPON COMPLETING FIFTY YEARS OF SPLENDID SERVICE TO THE FOUNDRY INDUSTRY. IT HOPES THAT THE ONCOMING HALF CENTURY MAY BRING INCREASED INFLUENCE AND PROSPERITY TO ALL THOSE WHO HAVE MADE IT WHAT IT IS—THE FOUNDRY ORACLE.

THE GRAY IRON FOUNDERS' SOCIETY
EXECUTIVE VICE PRESIDENT
W. W. ROSE

Added Impetus

TO THE EDITORS:

I have just finished reading your editorial on Scrap in the September issue of THE FOUNDRY.

It is a very fine article, very timely, easy to read and to understand. I believe that much good will emanate from it, and that the campaign now under way will receive added impetus and that momentum needed so badly to bring it to an all-out successful conclusion.

Again, let me congratulate you, and may I add—We need more articles like it.

A. G. GIERACH
Works Manager
American Manganese Steel Division,
American Brake Shoe & Foundry Co.,
Chicago Heights, Ill.

Drive Facts Home

TO THE EDITORS:

I have just been reading the editorial in the September issue of THE FOUNDRY and want to compliment you on the concise manner in which you deal with the scrap shortage on the North American continent. I used to grind my teeth whenever I went to the Pacific Coast, to see the cargoes of scrap steel and iron being loaded on Japanese boats. I protested strenuously but mine was only a small voice crying in the wilderness.

Recently I addressed a group on the same subject that was dealt with in the editorial. The ever increasing restrictions placed on products for civilian use are becoming more severe as time goes on and it is necessary, once in a while, to drive home facts in order to make people realize that the war effort must come first, and if it does not, all further efforts, so far as so-called free countries are con-

80% of all sales of TRANSITE CORE PLATES are REPEATS!

That's because experience with these non-metallic core plates shows operators the many ways they step up production capacity . . . check these brief facts.

EASY TO HANDLE—Transite Core Plates are lighter than metal . . . more can be carried in one load.

STAY CLEAN—Actually Transite Core Plates are *self-cleaning* when both sides are used alternately.

HIGHLY CORROSION-RESISTANT—because of their asbestos-cement composition.

STRONG—Their fibrous nature provides unusual shock-resistance . . . minimizes breaking and cracking.

NON-WARPING—Their warpage tolerance is as low as, even lower than metal plates.

ECONOMICAL—Transite Core Plates combine low initial price, low handling costs and long life.

No critical materials are used in Transite Core Plates. For full details, write Johns-Manville, 22 East 40th St., New York, N. Y.

Johns-Manville
TRANSITE CORE PLATES

cerned, will be at an end whether we like it or not.

Many domestic consumers of heavy industries goods cannot understand why their wants cannot be looked after as they were in the free and easy past, so that it is necessary whenever opportunity offers, to drive facts home.

L. L. ANTHES
President

Anthes-Imperial, Ltd.
Toronto.

Scrap Is Collected In Main Office

Good luck horse shoes with the nails still in them, pulled right off the barn door, are included among the items that have bobbed up recently in the pocket edition scrap collection depot established at the main office of the Bethlehem Steel Co., Bethlehem, Pa. The office building canvass for scrap, now in its sixth week has yielded four truck loads of iron and steel scrap weighing 15,568 pounds, and a considerable amount of copper and other nonferrous metals.

Idea for the pocket edition scrap collection depot originated in a scrap canvass in the company's sales department and was based on the theory that if all the gadgets, metal paper weights, ash trays and salesmen's superfluous samples in the sales offices were collected they might amount to a worth while poundage of usable scrap. Incidentally their loss would improve the appearance of the offices.

A basket was placed in an office temporarily vacant. In a few days nearly a ton of scrap was deposited in it. Other departments followed suit. Scrap derived from such small articles as those from the office building alone began to mount into the tons. Enlarging the scope of their activities some of the employes around their homes began to gather small articles that might make good scrap. They carried these articles to work with them and threw them into a hamper placed on permanent location in the reception room.

Since the scrap roundup has gone into this stage it shows signs of lasting for the duration. Articles range from egg beaters, roller skates, horse shoes and heavy weight kitchen spoons to automobile bumpers and springs. Recently an employe brought in an automobile spring which tipped the beam at 24 pounds, 4 ounces. After resting for a day he brought in the mate wrapped in a newspaper. A horse shoe that found its way into the collection recently weighed 1 pound 7½ ounces. If each of the company's 3000 office employes brought a horse shoe of this weight or its equivalent in scrap each day, the total would amount to 2¼ tons of scrap for the furnaces.

A pocket edition scrap collection at the main office of the Bethlehem Steel Co. has produced nearly 8 tons of metal

---

W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, is altering and improving its plant.

BY THE POUND OR BY THE TON A DETROIT ROCKING ELECTRIC FURNACE MAKES POSSIBLE PRECISE METALLURGICAL CONTROL

One of the many worthwhile advantages of a Detroit Rocking Electric Furnace is its ability to exactly reproduce in quantity any ferrous or non-ferrous product desired.

It's no trick at all to control the metallurgical results from any kind of heat in a Detroit furnace from 200 to 8,000 pound capacity. Once a melting cycle has been established it may be repeated consistently—uninfluenced by human error. You can obtain a completely automatic rocking and heating cycle throughout the entire melting period thus reducing the melting problem to one of mechanical routine.

For close chemical and metallurgical control the Detroit Furnace with its exclusive, automatic stirring action under non-oxidizing conditions, simply cannot be beaten. Write today for further facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

Develops New

ROLL MAKING TECHNIQUE

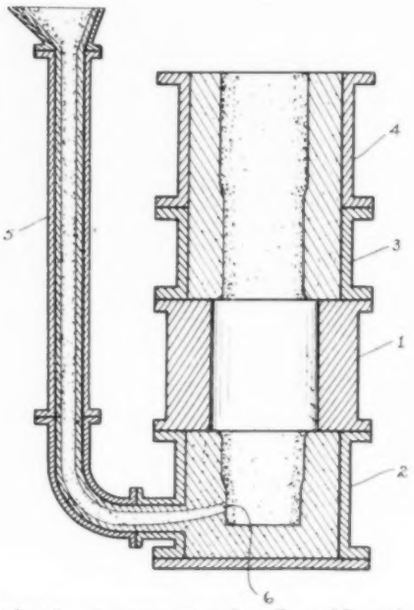
By PAT DWYER

EVERY person who has been a student—voluntary or involuntary—of ancient and modern history, probably has noticed a peculiarly similar slant in all the writing. After deducting the usual 47 per cent for national or racial prejudice which minimizes or ignores the exploits of foreigners and exalts similar exploits on the part of the nation in which he proudly claims membership, the historian devotes 90 per cent of his space to a graphic account of armed conflict. The remaining 10 per cent discusses briefly the activities of men who—to use a homely phrase—minded their own business.

Men who have been responsible for the extermination of hundreds, thousands and in some instances millions of human beings receive voluminous attention. Other men who have devoted their lives to measures which increased the health, happiness and economical status of their fellows are passed over with the brief comment: J. Jones, b. 1871, d. 1932.

Phillip of Macedon, Xerces, Herod, Putemandtakum the Egyptian Pharaoh, the war minded Shepherd, Kings of Israel, Julius Caesar and Hannibal have mouldered away into silent dust thousands of years ago and yet their names are as well known today, as they were in the heyday of their power and sanguinary glory.

No books have been written, no monument erected and no plaque marks the spot in England where Henry Cort in 1754 threw a figurative pebble in the industrial mill pond. The ripples gradually spread until the effect was felt in every country in the world where metals are fabricated. To use another simile or illustration, the tiny bottle opened by Alladin Cort, released a giant greater than Goliath of Gath, greater than Paul Bunyan, greater than any other that ever existed either actually or in imagination.



Sketch of conventional roll mold with various parts indicated by numerals

In 1754 Henry Cort set up two grooved rolls, one above the other, and through them he passed heated billets to form the first product of a rolling mill. Naturally the process and equipment were crude, but they worked. The basic principle was correct. In the intervening almost three centuries thousands of men have applied their inventive genius to refinement and improvement of the process.

In developing the rolling mill, the

6' 0" x 10' 00"
Capacity 10 Tons

There'll be STEADIER SCHEDULES *in* PLANT PRODUCTION

now that this Robins Shakeout is installed

A certain plant in a midwestern city is going to maintain a more constant flow of production from now on . . . a weak point in the production line has been eliminated. Instead of the outmoded type of shakeout where the load is carried by bearings, a Robins Full-Floating Shakeout has been installed . . . instead of an inherently weak device, a soundly-engineered mechanical aid is in operation.

In the Robins Shakeout there is no eccentric shaft with fixed main bearings vulnerable to failure through impact and overloads; there are no rigid bearings to withstand the impact of careless loading or accidental dropping of the 10,000 lb. flask. Instead, an unbalanced pulley principle is employed, with the entire load supported on coil springs . . . cushioning the weight . . . making it full-floating.

Another safety feature is the complete absence of extensions and protruding parts . . . nothing that could trip workmen or tear their clothes. Less floor space is required, too.

There'll be steadier schedules in plant production—now that this Robins Shakeout is installed. Robins engineers have solved another problem in the all-out effort to win this war.

FOR MATERIAL AID IN MATERIALS HANDLING...

It's ROBINS

ROBINS
CONVEYING BELT COMPANY
PASSAIC, N. J.

Mackintosh-Hemphill Co., oldest foundry in the Pittsburgh district has pioneered in design and construction of complete units and in the various component parts. The company cast the first chilled roll west of the Alleghenies and possibly the first in North America. Since that time the company has carried on a constant program of improvement in materials and methods in what is regarded as one of the most, if not actually the most highly skilled branch of the foundry industry.

The most recent development by F. C. T. Daniels, vice president, which is patented, relates to a simple and satisfactory method of making cast iron metal working rolls having a relatively hard roll body and relatively soft and machinable necks. Various methods of effecting this same general purpose previously have been employed. The present development specifically considered provides a method simpler than some of those previously employed and is claimed to give more satisfactory results than any other prior method for obtaining the same effect.

Wash Out Center Metal

One previously employed method developed in Germany has been to make rolls having a hardened body surface or chill, and necks which are softer and more readily machinable than the hardened surface of the roll body, by washing out from the mold all of an initially poured hot metal, save that which is included in the hardened surface or chill depth of the roll body. However, it frequently is unnecessary or undesirable to make a roll having the interior of its body composed of metal of different composition than that of the body surface or chill. Also the casting of a roll by initially pouring a hard metal and washing out the still molten portion, after the metal to the desired depth has been congealed against the surface of the chill, or surface of the body portion of the mold, is a procedure requiring accurate timing and delicacy of operation. There is a tendency to wash out a portion of the initially congealed metal and thus to give a chilled shell of unequal or unpredictable depth, in pouring the second metal to wash out all the uncongealed initial metal in the mold.

To make a roll having necks more machinable than the body, a procedure has been to bottom pour a mold up to a level slightly above the body region of the mold. After a chill has formed against the surface of the body portion of the mold enough softer metal is added to fill the drag neck and wabbler portion of the mold. The metal thus displaced is run off at a level just above the body portion of the mold. Initial metal is displaced upwardly by the softer metal poured into the lower or drag portion of the mold. In this procedure the tap hole through which the surplus metal is drawn off then is closed and the upper or cope neck of the roll is filled with softer metal.

This method involves running off metal of the initial charge which usually is metal of high alloy content and relatively expensive. The quantity thus displaced is equal to the weight of metal initially included in the drag neck, drag wabbler and the vertical runner. In the recent development the entire weight of metal introduced into the mold at various stages in the roll casting operation is retained in the mold. Therefore, there is no scrap loss of the relatively expensive high alloy metal of which the hardened body of the roll is formed and there is no danger of washing out metal which it is desired to include in the surface chill of the roll body. Only about one-half as much metal is required as an additive in the cope neck and sink head, as in a method in which the initially poured metal is inhibited from rising substantially in the neck cavity and sink head in the cope portion

SAVE WORKERS' TIME

From 8 to 10 persons can wash simultaneously at a Bradley.

Guard Against Lost Man-Hours with Improved Wash Fixtures

● Lost man-hours from whatever cause are a serious menace to wartime production. Physicians experienced in industrial work claim Dermatitis (skin affection) is a major source of lost man-hours. They place proper washing facilities first among preventive measures.

Bradley Group Washfountains are providing more essential service today than ever before. Each Bradley serves clean sanitary spray of running water to each of 8 to 10 persons simultaneously. The self-flushing deep bowl prevents collection of water and possible contamination. Time and space are saved, and water consumption reduced by 70%. Helpful suggestions are contained in our "Washroom Layout" booklet—write for a copy. BRADLEY WASHFOUNTAIN CO., 2217 West Michigan St., Milwaukee, Wis.

BRADLEY washfountains

of the mold for making rolls.

The accompanying illustration, a conventional representation of a mold assembly for roll casting, shows in vertical section a conventional structure in which the method can be practiced advantageously. The mold comprises a central body portion formed as a body chill, 1, a sand drag, 2, providing the mold for one roll neck and the wabbler or coupling structure associated with it, a sand cope, 3, providing the mold for the other roll neck and its associated wabbler or coupler structure, and a sink head, 4, providing an upward extension of the mold assembly. A vertical runner, 5, communicates with the lower region of the lower or drag portion of the mold cavity by way of a gate, 6, in the drag mold, 2.

By pouring through the vertical runner, the mold cavity is filled with metal to a level above the upper extent of the roll body cavity and below the upper level of the cavity within the mold cope which provides space for the roll neck and its associated parts. After waiting until centrifugal motion in the metal teemed into the mold has ceased and the metal has become quiet, a soft machinable iron is poured into the runner, 5, and down gate, 6, in the drag mold, in weight sufficient to replace the original hard metal in the drag mold and in the vertical runner and gate. This different metal is poured with sufficient rapidity to displace bodily the original metal upwardly in the mold, so that in the upper region of the mold cavity the level of molten metal is raised to a corresponding extent, but none of the metal is run off.

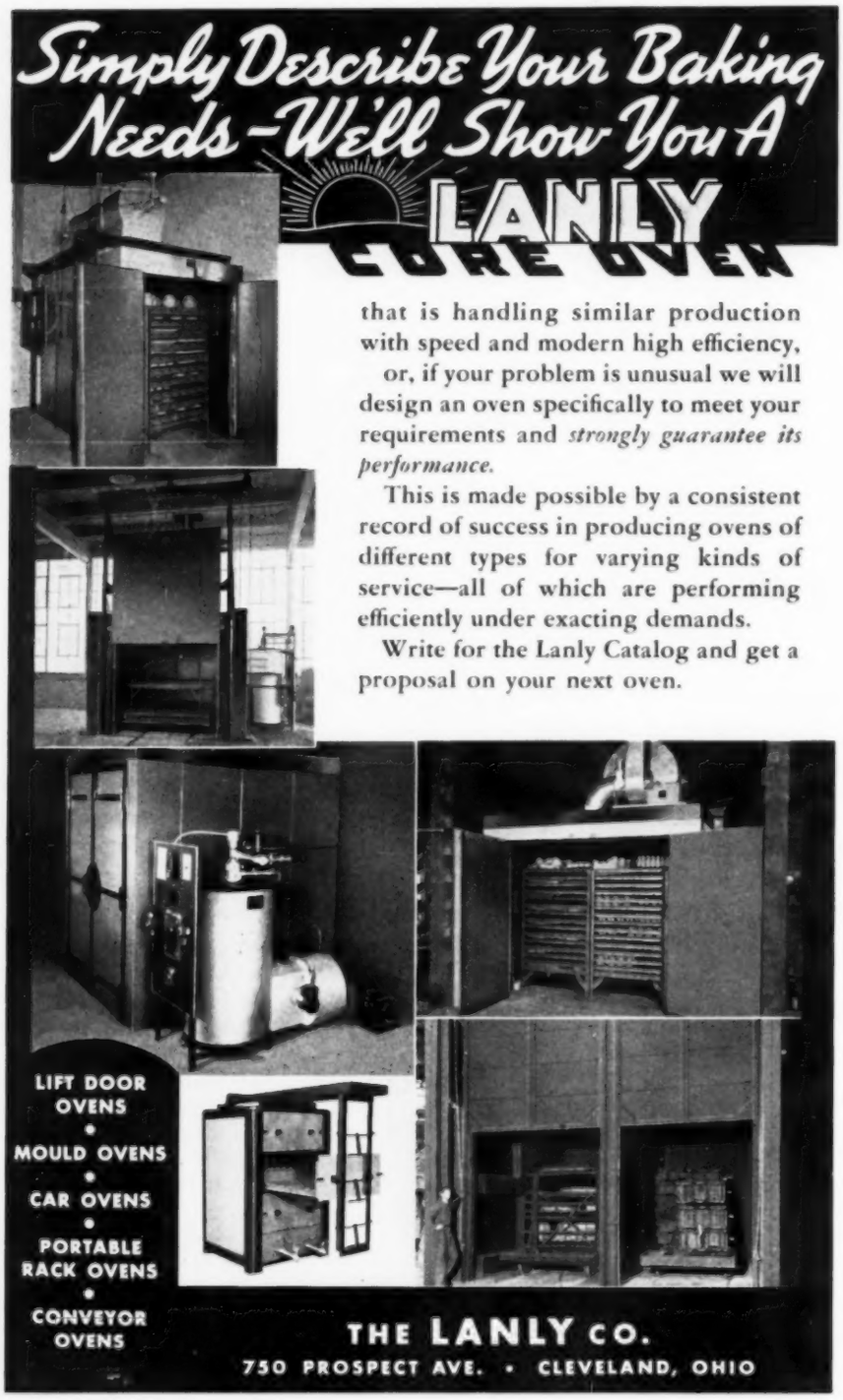
The initial harder composition metal of which the roll body is to be composed, then extends from a level just below the lower level of the body cavity to a level lying approximately at the upper end of the cavity for the cope neck and wabbler. As this would give a roll having one soft and machinable neck and one neck of the same hard metal as the roll body, a dilutant metal of a softer composition is poured into the sink head. During the time of all the previous steps the original metal is being congealed by the body mold chill and has solidified 2 to 6 inches in depth, so is undisturbed by the addition of the dilutant metal well above the body cavity of the mold.

Dilute Neck Metal

If the metal which has been poured to form the drag neck is of sufficiently soft composition, it may be used to dilute the metal in the cope neck. Usually this metal is added in a weight equal to the weight of metal lying in the neck cavity of the cope mold. If desired, the sink head may be of sufficient capacity to accommodate a weight of metal greater than that included in each of the roll necks. The dilutant metal may be added in the upper mold region in a weight greater than that of the metal initially standing therein. However, it is unnecessary in this mixing step to overflow any of the metal poured into the mold at any stage.

As exemplary of this simplest procedure, the initial charge and the additive charges may correspond to the following general formulae: Initial charge—Silicon 1.04 per cent, sulphur 0.048 per cent, phosphorus 0.093 per cent, manganese 0.46 per cent, carbon 3.42 per cent, nickel 4.18 per cent, chromium 1.96 per cent. Additive charge—Silicon 1.62 per cent, sulphur 0.064 per cent, phosphorus 0.085 per cent, manganese 0.68 per cent, carbon 3.86 per cent

In the finished casting the roll body, save in the blending zones at the junction of the body and necks, will have the approximate composition of the initially cast metal. The drag neck will have the approximate composition of the additive metal. The cope neck, assuming that it consists in equal proportions of the initially cast metal and of the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additive metal will have approximately the following composition: Silicon 1.33 per cent, sulphur 0.056 per cent, phosphorus 0.89 per cent, manganese 0.57 per cent, carbon 3.64 per cent, nickel 2.09 per cent, chromium 0.98 per cent.

Men skilled in the art of roll making will recognize that this latter composition, produced by diluting the hard initially cast metal with the softer additive metal, is sufficiently soft to be readily machinable. A somewhat softer cope neck may be obtained without varying the compositions of the metals, by adding the dilutant metal of the additive composition to the cope mold in a weight somewhat exceeding the weight of the initial hard metal therein.

The following is another exemplary set of analyses illustrating a case in which there is greater diversity between the roll necks, but in which the cope neck of the roll is readily machinable: Initial metal—Silicon 0.51 per cent, sulphur 0.082 per cent, phosphorus 0.42 per cent, manganese 0.23 per cent, carbon 3.38 per cent, nickel 4.48 per cent, chromium 0.76 per cent, molybdenum 0.48 per cent. Additive metal—Silicon 1.72 per cent, sulphur 0.084 per cent, phosphorus 0.46 per cent, manganese 0.64 per cent, carbon 3.76 per cent.

Iron Is Machinable

When the metal of the additive charge is mixed in an equal weight with the initially cast metal lying in the cope mold, the resultant composition in the cope neck will show: Silicon 1.12 per cent, sulphur 0.083 per cent, phosphorus 0.44 per cent, manganese 0.45 per cent, carbon 3.57 per cent, chromium 0.38 per cent, nickel 2.24 per cent, molybdenum 0.24 per cent. This composition is readily machinable.

Where it is desirable to effect a low graphite content in the roll necks, the additive metal will be machinable, but not capable, when added in any reasonable quantity as a dilutant to provide a machinable cope neck when mixed with the initially cast hard metal. The additive metal would have some composition as: Silicon 0.70 per cent, sulphur 0.083 per cent, phosphorus 0.44 per cent, manganese 0.45 per cent, carbon 3.00 per cent. One of two variant procedures is employed to render the cope neck machinable.

One procedure assumes that there is available a melt of softer metal than that poured in the drag and corresponding approximately to the formula: Silicon 1.36 per cent, sulphur 0.056 per cent, phosphorus 0.56 per cent, manganese 0.57 per cent, carbon 3.64 per cent.

If added in a weight equal to that of the metal previously standing in the cope portion of the mold, and assuming that the initial metal responds to the formula for the roll body metal first given, the dilution would give in the cope neck a final composition corresponding approximately to the formula: Silicon 1.20 per cent, sulphur 0.057 per cent, phosphorus 0.327 per cent, manganese 0.52 per cent, carbon 3.53 per cent, nickel 2.09 per cent, chromium 0.98 per cent.

However, if no satisfactory second dilutant metal is readily available an alternative procedure consists in pouring initially so that the molten metal stands at a level slightly above the body cavity of the mold. An additive metal of moderate graphite forming tendency is then poured to replace the initial metal in the drag mold, displacing hard metal upwardly to fill the cavity for the mold neck. At this stage and before making any further addition finely divided ferrosilicon is stirred into the initial metal standing in the cope cavity.

If for example the initial metal and the additive metal respond respectively to the following: Silicon 1.04 per cent, sulphur 0.048 per cent, phosphorus 0.093 per cent, manganese 0.46 per

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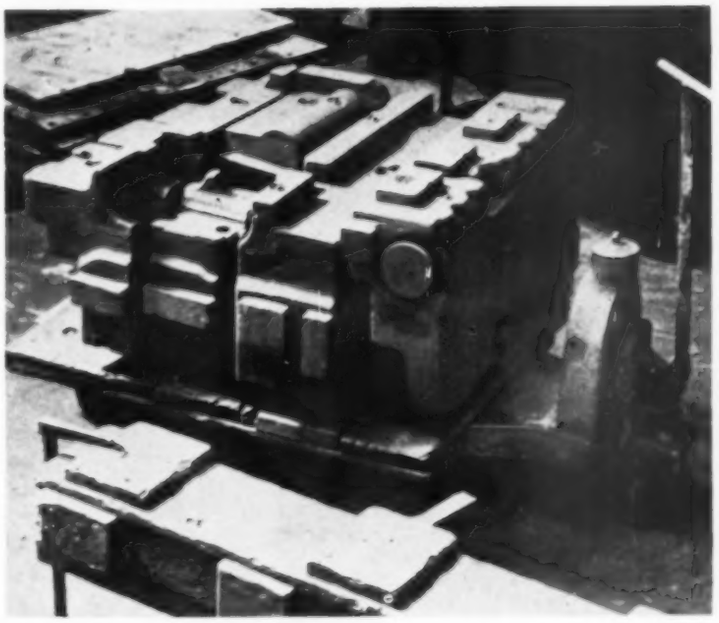

Untouched photo of core made by Hansell-Elcock, Chicago, users of CITIES SERVICE DELCO CORE OILS. Core for horizontal boring and milling machine—Weight: 4000 lbs. Cores set 1/32 of inch apart. Tensile Strength: 40,000-45,000 lbs. Brinell 190-200.

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cent, carbon 3.42 per cent, nickel 4.18 per cent, chromium 1.96 per cent; and silicon 1.10 per cent, sulphur 0.066 per cent, phosphorus 0.095 per cent, manganese 0.60 per cent, carbon 3.72 per cent, sufficient ferrosilicon may be added to give as a resultant a composition having a higher silicon content. For example, sufficient ferrosilicon usually is added to bring the metal of the upper roll neck into approximate correspondence with the composition: Silicon 1.27 per cent, sulphur 0.057 per cent, phosphorus, 0.094 per cent, manganese 0.53 per cent, carbon 3.56 per cent, nickel 2.09 per cent, chromium 0.98 per cent and remainder iron.

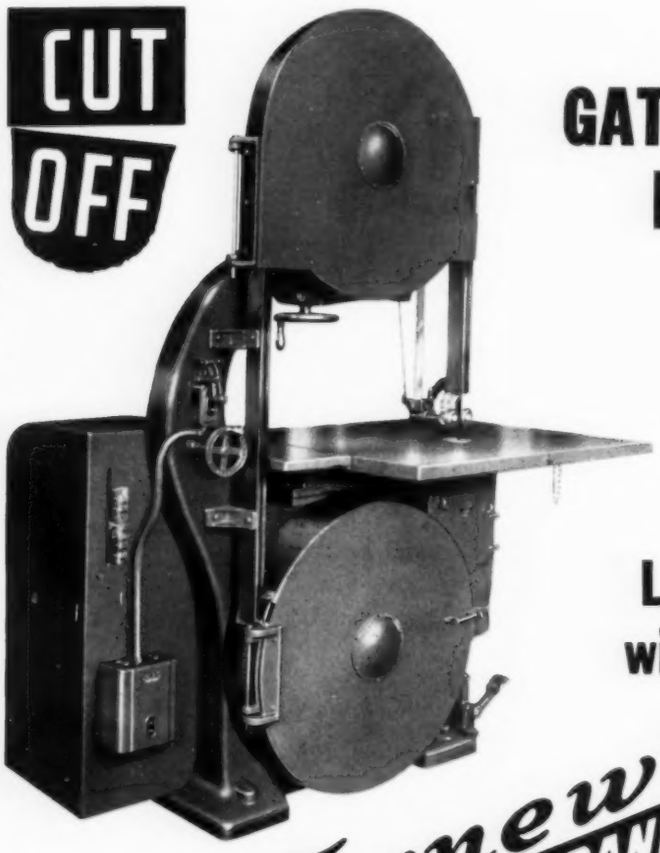
Other graphitizing agents, such as a silicon-manganese-aluminum alloy may be used. If desired, the graphitizing agent may be added to the additive metal in the ladle, rather than to the metal in the mold.

Numerous modifications may be made in the composition used without going beyond the principles of the invention. The dilutant metal may be added to the initial metal in the cope mold in a weight less than that of the metal with which it is mixed, rather than in a weight equal to or greater than the weight of the initial metal, if the nature of the compositions renders such proportioning desirable.

The gist of the development resides in the discovery that a roll may be made with necks of metal more machinable than the metal forming the body of the roll by replacement in one roll neck, and may effect dilution without removal of any of the initial metal in the other roll neck. This is in marked distinction to previous methods for attaining the same purpose. By dilution in the upper neck cavity of the mold in distinction to replacement of metal therein, the formation of a perfect bond is insured between the roll body and the upper roll neck, while obtaining in the upper roll neck as well as in the lower roll neck a composition and quality of the metal which is within the bounds of what the art considers to be a readily machinable metal.

Metal Is Mixed

This can be done while obtaining a roll body adequately hard for many conditions of use, by a simple apportionment in the composition of the initially poured metal and of the additive metal. Since the additive metal of the lower roll neck displaces upwardly the metal initially standing in the mold, there is no washing effect resultant from that action. Addition in the upper neck cavity of the mold is effected by mixing in distinction to replacement. Washing in the metal of the roll body is not caused by this latter addition. Economy of the method of making a roll having readily machinable necks and relatively hard body over methods in which all of the uncongealed initial metal is washed from the mold, and methods in which initial metal is run off from the upper neck cavity in the mold and replaced with a different metal, is obvious to those skilled in the art of roll making.



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Analysis Explains Priority System

Research Institute of America, 292 Madison avenue, New York, recently has published an analysis of the revised production requirement plan entitled, "PRP, How the New Priority System Works". The analysis provides instruction on what to do and what information to include in application for material under the priority system. It also advises careful accounting practice so that all requests for material may be substantiated by government inspectors checking the accounting books of the organization. Copies of the analysis may be obtained from the institute for $2.00.

Specifications for Gray Cast Iron

The American Society for Testing Materials issued on June 18, 1942 additional emergency alternate provisions in the standard specifications for light-weight and thin-sectioned gray iron castings under the designation EA-A190. Arranged in the interest of expediting procurement or conservation of materials, they are intended for use where they may be considered by the purchaser as a permissible alternate for the specific application or use desired. They are as follow:

The following Emergency Alternate Provisions, when specified, may be used as alternates in A.S.T.M. Standard Specifications for Lightweight and Thin-Sectioned Gray Iron Castings (A 190—40) and affect only the requirements referred to:

Section 1.—Change the last two sentences from their present form to read as follows:

Strength is not a primary consideration in the castings covered by these specifications, so all reference to classification by strength or to physical tests for strength is intentionally omitted. In those cases where some test is felt necessary to determine serviceability, such test should be made as provided in Section 3.

Omit the note which follows this section.

Section 3.—Change from its present form to read as follows:

3. *Physical Tests.*—On mutual agreement by the manufacturer and the purchaser, it is permissible to test castings in service and to test individual castings to destruction. The cost of such tests shall be borne by the purchaser. When such tests are mutually agreed upon, it is advisable that details thereof and provisions for acceptance and rejection be included in the order or purchase contract. Castings ordered to tensile strength or transverse strength requirements should be purchased in accordance with the Standard Specifications for Gray Iron Castings (A.S.T.M. Designation A48) of the American Society for Testing Materials.

Section 9. Change from its present form to read as follows:

9. Certification.—Upon request of the purchaser, the manufacturers shall be prepared to certify that his product conforms to any physical test requirements or alloy analysis covered by these specifications.

Book Review

Foundry Work, by R. E. Wendt, head instructor foundry practice Purdue University; 260 pages 5½ x 7 inches; 229 illustrations; published by McGraw-Hill Book Co., Inc., New York.

That this book is filling its intended purpose in a highly satisfactory manner, is indicated by the fact that this is the fourth edition brought out in the past 20 years. The latest includes new exercises in bench and floor molding, discussion on the causes of the defective castings and suggestions for safety measures in the foundry. Although written primarily as a text book for engineering students taking a foundry course in the university where the author has been instructor for many years, it will be found particularly applicable during the present emergency period when so many commercial foundries are faced with the necessity of developing training courses for young and unskilled help.

The text is divided into seven sections in which the first treats of groups of cast metals, tools, flasks, sand and fundamental principals of molding. The second is devoted to exercises in bench and floor molding. The third section covers pattern equipment, pattern colors, casting design, molding machines, and molding methods in mass production. Cores and coremaking practice are described in the fourth section. Cupola practice, mixing of metals, cleaning and grinding castings are dealt with in the fifth section. The sixth section is devoted to nonferrous foundry practice

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and equipment. The seventh and concluding section deals with manganese problems, casting defects and safety measures. The book contains a glossary of foundry terms and an index.

F.E.M.A. Will Meet In Cleveland

Annual meeting of the Foundry Equipment Manufacturers Association will be held at the Hotel Cleveland, Cleveland, on Friday and Saturday, Oct. 30 and 31. The program for the two day meeting is being built around the various problems which confront the foundry equipment industry in its efforts toward the winning of the war. All manufacturers are urged to participate.

The American Standards Association, 29 West Thirty-ninth street, New York, recently approved as American standards, two standards and specifications developed by the American Society for Testing Materials. The standards are: Malleable Iron Castings (ASA:G48.1- 1942; ASTM:-A47-33), and Cupola Malleable Iron (ASA:G49.1 - 1942; ASTM:A197 - 39). Copies may be obtained from the association for 25 cents each.

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Committee Named for Power Truck Group

WPB has appointed industry advisory committee for the industrial power truck industry. Members of the committee are: Eugene Caldwell, Williamette Hyster Co., Portland, Oreg.; Ezra Clark, Clark Equipment Co., Battle Creek, Mich.; D. L. Darnell, Baker-Raulang Co., Cleveland; C. D. Eiler, Crescent Truck Co., Lebanon, Pa.; L. J. Kline, Mercury Mfg. Co., Chicago; Milton G. Peck, Yale & Towne Mfg. Co., Philadelphia; and C. E. Smith, Towmotor Co., Cleveland. Graeme Darling, General Industrial Equipment branch, WPB, is government presiding officer.

Issues Bulletins

National Foremen's Institute, Deep River, Conn., has issued a bulletin entitled "A Confidential Report on Collective Bargaining" which discusses the present need for bargaining, and gives valuable pointers on the type of bargaining which is most advantageous. It sells for $1. Another bulletin by that organization is "The Self-rating Scale for Leadership Qualifications" which gives a practical and helpful evaluation system for executive ability. Price is 25 cents.

Book Review

Refractories, by F. H. Norton, associate professor of ceramics, Massachusetts Institute of Technology; cloth; 798 pages 6 x 9 inches, published by McGraw-Hill Book Co., Inc., New York; price $7.50.

This is the second edition of a book first published 10 years ago and represents a complete revision of the text to keep pace with new information in the field of refractories. In particular, comprehension of the nature of clay, mechanism of plastic flow, deflocculation of slips and reactions in firing demanded an entirely new treatment. Several new chapters have been added. In addition to tables, charts and other illustrations, the book carries an appendix of 12 pages of reference tables and an exceptionally liberal index of subject matter and authors. An extended bibliography at the end of each chapter lists practically every published reference to the subject under discussion.

The subject matter is presented in 24 chapters arranged under four main headings: Introduction, manufacture, properties, use. Scope of the work is indicated briefly by the chapter titles: Scope of the refractory industry in the United States, literature on refractories, history of refractory development in the United States, matter in the solid state,

aw materials, mining and preliminary iring, kilns, mortars, plastics, concretes reatment, mo'ding methods, drying, nd coatings, fusion point and equili-rium diagrams, load bearing capacity, palling, spalling fractures, reaction with lags and glasses, expansion and shrink-ge, heat transmission, sizes and toler-nces, miscellaneous properties, in the ron and steel industry, in the nonferrous metal industry, in the generation of power, in miscellaneous industries, brick-work construction.

Silicon Bronze Alloys Differ

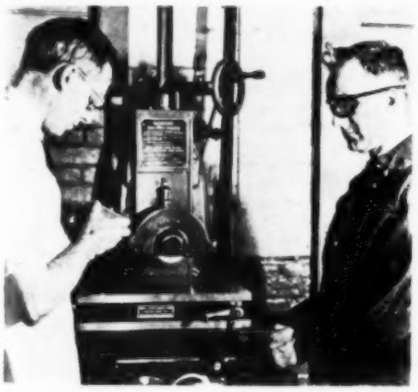
Due to the tin shortage increasing attention is being devoted to low-tin alloys, and to silicon bronzes. The latter are similar to gray cast iron in that they comprise a family of alloys rather than one single composition, and it is advisable to keep that in mind when discussing silicon bronzes. The practices employed with one may not work satisfactorily with others, and some of the reasons are shown clearly in the following from the July 24 issue of *The Metal Industry* (London, England) relating to a discussion of the Report of the Non-Ferrous Subcommittee of the Technical Committee of the Institute of British Foundrymen—the first section of which appeared in the September issue of THE FOUNDRY under the heading "Casting Silicon Bronzes":

Dr. W. O. Alexander, I. C. I. Metals Ltd., dealing with the silicon bronzes said the P.M.G. metal was developed essentially as a part substitute for gun metal in the days when tin was very expensive. Everdur, on the other hand, was developed originally solely for use in chemical factories where corrosion resistance was very important. It would be noted that all P.M.G. contained zinc, whereas for Everdur a zinc content of from 0 to 1.0 per cent was specified. The reason why P.M.G. could withstand the use of charcoal as a cover to the melt was that there was a partial vapor pressure from the zinc, and the danger of a gas pick-up was not so great as in Everdur, which might be zinc-free. The makers of P.M.G. always preferred to have a charcoal cover to prevent oxidation, whereas in the case of Everdur some oxidation was tolerated; it was only very slight, because silica sand was quite protective, but it was desired to avoid any chance of gas pick-up from materials such as charcoal.

Another point was that, inasmuch as there was no zinc in the original Everdur, there was a tendency toward some slight reaction between the sand of the mold and the metal during pouring. The presence of zinc in the P.M.G. pretty well prohibited that. Whereas zinc could not be tolerated in the ordinary Everdur for chemical uses, the makers were prepared, in order to help the industry, and assuming there would be a call for silicon bronzes, to add up to 2 per cent of zinc; that should assist in the founding and production of silicon bronze castings.

Recalling Mr. Bailey's reference to

Safety Education



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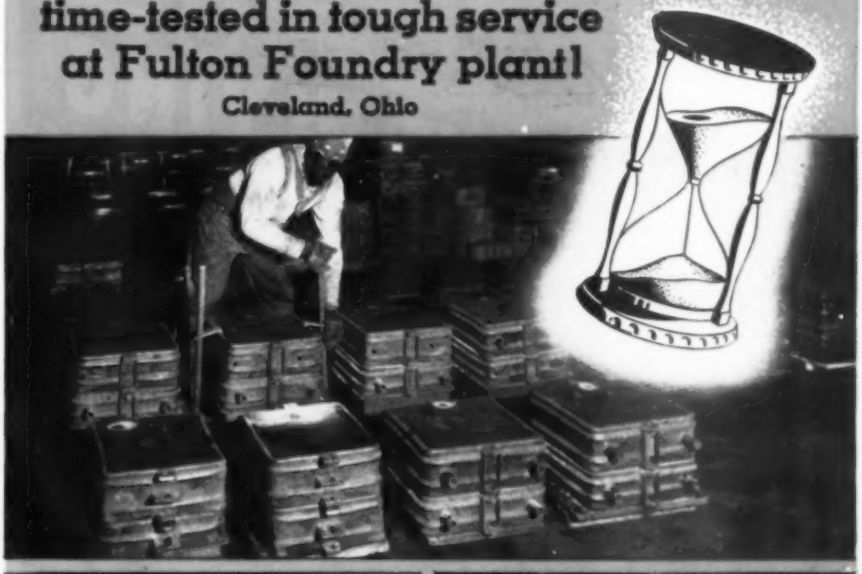

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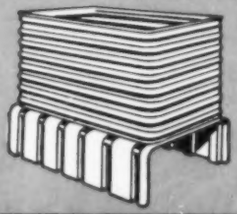

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TRUSCON FOUNDRY FLASKS

lead, Dr. Alexander said that that again emphasized a difference between P.M.G. and Everdur. P.M.G. contained iron, and it always gave a second constituent, i.e. iron silicide, and the presence of lead in P.M.G. was not favored. He suspected there was the formation of some complex iron silicide; in any case the presence of lead in P.M.G. would not produce a noticeable improvement in machinability, because the iron silicide was hard. By including lead in Everdur, however, the machinability could be improved; with small amounts of lead in Everdur there had been no untoward difficulty in producing sound castings. The reference to lead, in the report, was included to emphasize the idea of getting scrap mixed with silicon bronzes, particularly Everdur, was not so bad as to have Everdur mixed up with gun metal, and so on.

Book Review

Let's Write Good Letters, by Sherman Perry, 168 pages, 5¾ x 8¾ inches, cloth, published by the American Rolling Mill Co., Middletown, O., $1.00.

In 1924 the American Rolling Mill Co. published a book, *Making Letters Talk Business* which found great favor with commercial, industrial and educational organizations. To supplement and bring up to date the material published almost 20 years ago, a sequel has been prepared.

Information included in *Let's Write Good Letters* may be divided into three sections. The first deals with letters themselves—their purpose, how to organize material for them, tips on making letters original, as well as including valuable advice on writing sales letters and those in answer to claims.

The second section is directed to persons handling correspondence: Letter writers, secretaries, stenographers and other office employes. Their respective duties are discussed and suggestions offered as to what each can do to improve the organization's correspondence. The final section deals with the mechanics of letter writing and includes a concise review of English, grammar, and punctuation. The cross index which concludes the book makes the material presented readily available, especially if the volume is used as a desk manual.

Awarded Burgee

Rear Admiral Emory S. Land, chairman, U. S. Maritime Commission, and administrator, U. S. War Shipping Administration, presented the Maritime Commission "M" burgee to the Barberton Works, Babcock & Wilcox Co., Barberton, O., on Sept. 2 in recognition of the firm's outstanding achievement. The award was accepted by A. G. Pratt, president, Babcock & Wilcox Co., and the "M" burgee now flies alongside the Navy E pennant which was awarded to the firm on May 11.

Smooth Castings

High quality, smooth castings should have production pattern equipment where castings are to be produced in large quantities. The accompanying illustration shows several highly finished and accurate metal patterns used by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for casting motor parts

Dust
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Regular Inspection Pays Dividends

In the second of a series of articles in the September issue of *Link-Belt Speeder News* published by the Link-Belt Co., Chicago, in the interest of conserving America's machinery for sustained war effort, particular emphasis is placed on the importance of routine daily inspection. In one instance cited, a service man checked over a shovel which had not been operating up to par in three shift quarry service. He reported the machine covered with grease and dirt; clutch shoes assembled backward; bottom of hydraulic control system tank covered with sand indicating carelessness in handling oil when refilling; practically every bolt loose; no oiler on machine.

Fortunately such cases are exceptional. Majority of owners and operators will not tolerate these conditions. They take pride in keeping the equipment at top notch efficiency. Every machine on a production job should have an oiler. His duties include: Keeping the machine lubricated with grades of oil and grease and at intervals specified on the lubrication chart—too much grease in antifriction bearings is harmful. Wipe up excess oil and grease and keep it out of the clutches. Check oil level in crankcase and fuel tank and water level in radiator. Keep machine clean—a clean machine is far easier to maintain than a dirty one. Check all bolts and nuts for tightness while going over machine for greasing.

Where machines are running more than a single shift, time should be allowed each operator to make a careful checkup at the beginning of each shift. This should include the control system, engine, clutches and brakes, crowd and travel chains. He should check bearings for indications of heating. A good operator is more than a lever puller. He knows every detail of his machine, how to adjust it and make necessary repairs. He is responsible for care as well as operation while on duty.

On many large jobs repair work is done by a separate crew under the supervision of a master mechanic. This setup does not relieve the operator of his responsibility. He immediately should report anything requiring attention. As no two jobs are exactly alike it is difficult to set any hard and fast rules on inspection intervals. However, it is better too often than not often enough. A definite schedule should be established and followed.

Armour Research Foundation, Illinois Institute of Technology, Chicago, has appointed four new staff members as follows: Dr. Howard T. Francis, formerly assistant to the supervisor of chemistry, Engineering Defense Training Program, Pennsylvania State College, State College, Pa., as physical chemist in the metallurgical division; Anton Novy, formerly junior metallurgist, Fansteel Metallurgical Corp., North Chicago, Ill., to the ceramics staff of the metallurgical division; E. B. Penrod, formerly professor of physics, Hillsdale College, Hillsdale, Mich., as research engineer in the experimental engineering division; Dr. Joseph R. Spraul, formerly associated with American Can Co., as a member of the chemical engineering staff.

Book Review

Foreman's Policy Manual, by R. C. Oberdahn, 7 x 10 inches, 3-ring, loose-leaf binder, published by National Foremen's Institute Inc., Deep River, Conn., and available for $6.50.

This volume constitutes a manual of procedure for the foreman, and contains various policies, rules, practices, procedures and regulations developed by outstanding firms in this country. Since each firm has different situations, the material in the book is given only as a guide for the formulation of policies, rules, etc., to suit the particular needs. The book is divided into three sections

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Pattern Shop and Foundry Supplies and Equipment
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of which the first discusses the foreman's job. The second section deals with legislation, and the third with company policies.

Reorganize Service Field Offices

Toward more effective integration of its activities into the war effort on regional, state and local levels, the Apprentice-Training Service of the Federal Security Agency has reorganized its field offices into twelve regions, according to William F. Patterson, Chief of the Apprentice-Training Service.

This move not only will make for smoother working relations with other labor supply and training agencies but also will permit more specific utilization of existing apprenticeship facilities and personnel in rendering urgent service to key war industries. States in each region and headquarters cities follow:

Region 1. Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut, with regional office at Boston.

Region 2. New York, with regional office at New York.

Region 3. Pennsylvania, Delaware, and New Jersey, with regional office at Philadelphia.

Region 4. Maryland, District of Columbia, West Virginia, Virginia, North Carolina, with the regional office at Washington (temporarily).

Region 5. Michigan, Ohio, and Kentucky, with regional office at Cleveland.

Region 6. Wisconsin, Illinois and Indiana, with regional office at Chicago.

Region 7. Tennessee, Mississippi, Alabama, Georgia, South Carolina, and Florida, with regional office at Atlanta.

Regioon 8. North Dakota, South Dakota, Nebraska, Minnesota, and Iowa, with regional office at Minneapolis.

Region 9. Kansas, Missouri, Oklahoma, and Arkansas, with regional office at Kansas City.

Region 10. New Mexico, Texas, and Louisiana, with regional office at Dallas.

Region 11. Montana, Idaho, Wyoming, Utah, Colorado, and Arizona, with regional office at Denver.

Region 12. California, Nevada, Oregon, and Washington, with regional office at San Francisco.

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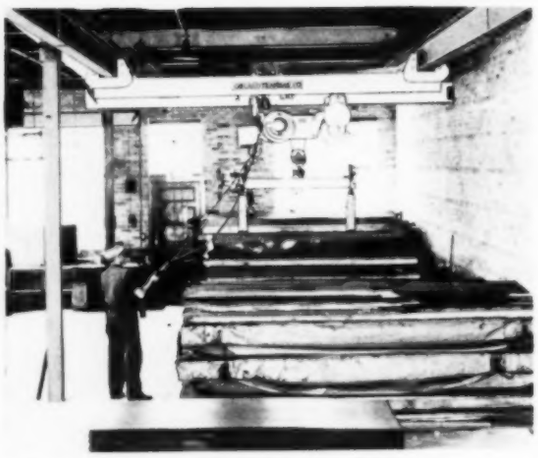

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Use either the Push-Type—Hand-Geared or Motor-Driven type equipped with 1, 2 or 3 motors operated by pushbutton control from the floor. Span up to 45 ft. between beam centers. Motor driven types have reducer units fully enclosed, running in oil. Trucks on all types are structural members of box construction for strength and rigidity. Steel wheels have double row ball bearings.

PILLAR TYPE No. 540

A self-supporting crane with 220 degree swing. Capacity up to 3000 lbs. with 14' radius. Furnished with hand or electric hoist, as required.

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Enlarges Plant

Osborn Mfg. Co., 5401 Hamilton avenue, Cleveland, manufacturer of industrial brushes and foundry molding machines, is making another addition to the plant consisting of a one-story building formerly occupied by the Lake Erie Lumber & Supply Co. at Hamilton and Marquette avenues. The structure is being remodeled and equipped with an overhead conveyor as a storage space for brush materials and machine castings.

Book Review

Labor Arbitration, Principles and Procedures, by John A. Lapp, LL.D., formerly chairman Coal Labor Board, 2nd Division; Referee, National Railroad Adjustment Board; member Petroleum Labor Policy Board, etc.; cloth; 231 pages 5 x 8 inches; published by National Foremen's Institute, Inc., Deep River, Conn. Price $3.50.

This manual devoted to the subject of labor arbitration is particularly timely at the present period of national emergency when urgently needed peak production occasionally is hampered by labor-management disagreements. In compiling this work the author has drawn liberally from his experience in arbitrating over 400 cases in the past 10 years. Beginning with an exposition of the field of labor arbitration and description of the various types of cases and laws pertaining to arbitration, Dr. Lapp presents a guide to the mechanics of conducting arbitration.

foundry activities

HULL IRON & STEEL FOUNDRIES LTD., Moncalm street, Hull, Que., has given general contract to Ed. Brunet & Son, and construction is underway on a foundry plant. This is a new project in connection with the company's $1,000,000 plant expansion program.

° ° °

Aluminum Co. of America, Detroit, is erecting a core storage building.

° ° °

Pelton Steel Casting Co., 148 West Dewey place, Milwaukee, is building a two-story foundry and cleaning room.

° ° °

Permold Co., West Liberty street, Medina, O., is having plans prepared for an addition to its plant.

° ° °

Westland Steel Foundry Ltd., 1395 Franklin street, Vancouver, B. C., is building a plant addition.

° ° °

R. H. Osbrink Co. has erected an addition to its foundry building at 6917 McKinley avenue, Los Angeles.

° ° °

Pacific Pattern & Mfg. Co., 3321 Union Pacific avenue, Los Angeles, is erecting an addition to its building.

° ° °

Monarch Aluminum Mfg. Co., 9301 Detroit Avenue, Cleveland, is building an addition to its foundry.

° ° °

Magnesium Casting Co., 5531 Riverside drive, Los Angeles, is building an addition to its foundry.

° ° °

Katelman Foundry & Mfg. Co., Council Bluffs, Iowa, was damaged by fire recently with a loss of $3000.

° ° °

Dominion Foundries & Steel Ltd., Hamilton, Ont., is taking bids for an addition to its plant.

° ° °

Furnace Parts & Foundry Inc., formerly located at West Fourth street and Cuyahoga avenue, Cleveland, has purchased a building in Garfield Heights, O., valued at $30,000 plus equipment. Otto J. Zeman is president of the foundry company.

° ° °

Dominion Foundries & Steel Ltd., Depew street, Hamilton, Ont., is taking bids through C. D. Howe Co. Ltd., for proposed plant on Homer street. Plans are underway for further additions to the company's Depew street plant.

° ° °

Aluminum Industries Inc., Cincinnati, has been awarded the Army-Navy "E" for excellence in its war production program. Officers of the company are:

WITH GKS OVENS

Automatic, trouble-free temperature controls insure an UNINTERRUPTED FLOW of perfectly baked cores and properly dried molds. Standardized designs with gas, oil, or electric heating units can be supplied promptly. GKS engineers will also build special ovens to meet any unusual production requirements. GKS Ovens are complete and are preassembled and tested to insure satisfactory service. *Write for Special Bulletin*

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PROCESSING OVENS
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AIR MAKE-UP SYSTEMS

GEORGE KOCH SONS, INC.

EVANSVILLE, INDIANA

John Eckerle, president; Harry J. Hater, executive vice president and general manager; R. T. Mesker, secretary; and M. A. Beckmann, vice president and assistant general manager.

° ° °

Mateas & Mateas is erecting a stucco foundry building at 504 Orchard avenue, El Monte, Calif.

° ° °

Index of new equipment orders for July, 1942, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 909.1 as compared with 884.4 in June. Index for repairs was 474.0. The index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

° ° °

Atlantic Foundry Co., 182 Beaver street, Akron, O., is building a one-story foundry.

° ° °

Charles H. Milles Foundry Co. 2209 West Thirty-fifth street, Chicago, has let contract for a one-story addition to its plant.

° ° °

Fox Furnace Division, American Radiator & Standard Sanitary Corp., Elyria, O., is changing over from furnace castings to magnesium castings. Alterations and additions to plant are underway.

° ° °

J. D. Troncola, who operates a foundry at 1522 North Spring street, Los Angeles, is building an addition to the plant.

° ° °

McQuay-Norris Mfg. Co., St. Louis, has been issued a building permit for the construction of a one-story foundry at 2320 Marconi avenue.

° ° °

Consolidated Mining & Smelting Co. of Canada Ltd., Trail, B. C., is building an addition to its foundry at Tadanac, B. C.

° ° °

General Metals Corp., 701 105th avenue, Oakland, Calif., is erecting a new foundry building on Eighty-fifth avenue, Oakland.

° ° °

Dowmetal Division, Dow Chemical Co., Bay City, Mich., is enlarging its production facilities with the erection of another magnesium foundry.

° ° °

J. A. Utley Co., general contractors, Royal Oak, Mich., is taking subcontracts for an aluminum foundry for the Ford Motor Co., Dearborn, Mich.

° ° °

Ohio Stove Co., Portsmouth, O., has opened a jobbing foundry on Eleventh street, west of the main plant of the company. It is equipped for the production of heavy and light gray iron.

How to Select YOUR CORE OVEN

● Let's avoid being dogmatic. It's not the burner or heater or control or oven by itself that provides correct, uniform baking for your cores. Good convection heating is that combination of heating, heat transfer, air circulation and ventilation systems which, when applied to an oven properly built to handle a load of the same or different size cores or molds, produces the desired baking quality in minimum time, with minimum fuel consumption. To that end make sure that

1—Your oven is of adequate size, proper dimensions, sufficient insulation and good construction to take care of the core load and provide for flexibility in enlargement or movement to avoid obsolescence.

2—The handling system, whether shelf, truck, rack or conveyor, suit your particular needs, as to core size and quantity and general foundry conditions.

3—The fuel selected is readily available and economical to use and that the heating system utilizes this fuel efficiently and generates the heat in adequate quantity.

4—The heat recirculation and ventilation systems are arranged to permit the heated air at constant temperature to contact all the core surfaces easily and frequently, thereby readily removing the moisture and oxidizing the binders uniformly, producing strong dry cores in minimum time.

5—Temperature control and ventilation and heating systems should be interlocked to provide automatic protection against fuel, power or draft failure.

The proper combination of all the above factors applied to your specific core baking problem will help produce the oven your plant deserves.

For Good Core Oven Practice—It's All in the "Know-How".

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Book Review

Blueprint Reading For the Metal Trades, by W. A. DeVette and D. E. Kellog, vocational department of the Erie Public Schools, Erie, Pa.; fabricoid, 132 pages 8 x 11 inches; published by the Bruce Publishing Co., Milwaukee, price $2.50.

Although the book might be employed for private study, it is designed primarily as a text book for class use presided over by a teacher. Each chapter concludes with an assignment to test the knowledge of the student. The completed assignment in each case is to be examined by the teacher who then will point out any discrepancies.

Text and illustrations begin with simple shapes and advance gradually and progressively to a deliniation of intricate shapes and assemblies. The following chapter heads indicate the scope of the work: Blueprinting process, working drawings, sketching, reading a drawing, invisible edges, oblique surfaces, cylindrical objects, sectional views, screw threads, reading dimensions, assembly drawings, finish and finish marks, limits tolerances and allowances, gearing, miscellaneous reading problems.

RAMABILITY OF FOUNDRY SANDS

(*Continued from page* 79)

batch. Permeability numbers were calculated from volume-time-pressure data for air flowing through the specimens. The compression strength was determined on a Dietert universal testing machine.

Main interest in this investigation is centered about the density of the sand specimen. Fig. 1 is an attempt to correlate the factors involved in the preparation of any rammed sand specimen and their relation to the properties obtained. The ingredients going into a foundry sand mixture have some characteristic physical properties, modified by mixing and processing and later on by ramming, which give the sand the properties which are significant for a foundry sand. These characteristic properties, or primary factors, of the ingredients are listed in Table I. In the mixing and processing procedure, new or modified properties are developed as shown in Table II. The foundryman is generally not interested in the permeability and strength of the sand as mixed. The only test conducted on a sand in this condition is the moisture test.

Table I

Primary Factors

1. Characteristic properties of the sand grains
   a. Grain size
   b. Grain shape
   c. Grain distribution
   d. Surface condition of grains
2. Characteristic properties of the binder
   A. Solid binder, not soluble in water
      a. Size of particles
      b. Shape of particles
      c. Colloidal properties
      d. Swelling in water
   B. Solid binder, soluble in water
      a. Lubrication properties of the solution
      b. Viscosity of the solution
      c. Surface tension of the solution
      d. Adhesive and cohesive properties of the solution
      e. Solubility limit
      f. Swelling
   C. Liquid binder
      a. Lubrication properties
      b. Viscosity
      c. Surface tension
      d. Adhesion and cohesion properties
      e. Solubility of water and thinner
3. Characteristic properties of the water
   A. As affected by temperature and impurities
      a. Lubrication properties
      b. Viscosity
      c. Surface tension
      d. Wetting properties
      e. "Gelforming" properties

It is the opinion of the authors that a test for ramability should be made before any ramming has been inflicted upon the sand. Dietert's[1] flowability test is a ramability test on a partly compressed specimen. Ramability is the ability of sand grains and binder in a foundry sand to move under pressure and form a compact body of uniform density. It is impossible to get a complete picture of this property if part of the compression is omitted. This flowing within the sand is controlled by the inner friction, and the factors involved are the ones summarized in Tables I and II. These factors largely determine the *structure* of the sand.

Seen from a structural point of view, foundry sands may be divided into:

1. Sands with imbedded grain structure
2. Sands with contact grain structure

The imbedded grain structure, Fig. 2, is characteristic for a well-mulled and aerated sand bonded with a pasty or colloidal binder. The individual sand grains are surrounded by a layer of binder strong enough to keep the grains partly or wholly apart. Under compression, the sand grains will move with respect to each other under simultaneous flow of the binder which will be squeezed

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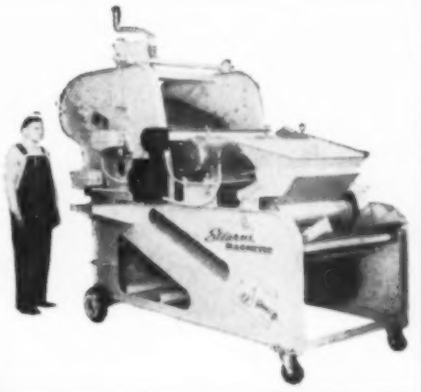

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These are facts from actual users that prove Stearns Magnetic Separators definitely profitable investments. . . . Conservation of metal is a "must" these days but to do it economically, automatically, smoothly on such jobs as reclaiming brass, aluminum and other secondary metals from borings, chips and metal refuse requires well designed and well built Stearns Magnetic separating equipment.

If you are interested in increasing the value of your scrap metal write for this Bulletin 302. No obligation. Investigate Stearns Magnetic methods.

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into the intergranular voids. The grains move closer and closer together. The structure thus gradually approaches the grain contact type.

The governing factor in this process is the *flowability of the binder*. It is very important to notice that the flow in this case takes place under decrease in volume of the sand body. An adequate term for this type of flowability would be decreasing volume flowability, decreasing void flowability, or increasing density flowability. Since the decrease in volume seems to be the main thing in this process, the term *compressibility* might suit it better.

The compression of the sand under ramming, i.e., the change from imbedded to contact grain structure, does not take place immediately throughout the sand body. It progresses gradually from the point where ramming is applied. The contact grain structure is a state in which the sand is strong and has a fairly low deformation. The opposite is true for the imbedded grain structure. This reasoning applied to the ramming of a mold means that the molder has to ram the sand until the process of progressive compression is completed throughout the layer of sand. Not until then can the molder be sure of having a desirable hardness at the pattern surface.

P. E. Kyle[2] has the same thing in mind when he states ". . . Flowability, as applied to molding sands, should indicate the property which permits sand to be rammed, squeezed, or jolted around a pattern in such a way that the energy causes the sand to surround the pattern completely and be at a suitable, uniform hardness at the pattern surface without producing undesirable hardness conditions in other regions of the mold. . . ."

It is also the property that H. W. Dietert and F. Valtier[1] investigated when they developed the decreasing volume method for determining the flowability. The specimens shown in Fig. 5 are very similar to those given by those authors in their paper, and indicate an intermediate state in the progressing compression. The porous part at the bottom of the specimens is still in the imbedded grain state, while the other end is compressed to a contact grain structure.

The contact grain structure Fig. 3, will be found in sands containing oil binders, or in any other type of sand sufficiently and uniformly compressed. The grains in contact may not be uniformly arranged or packed in the closest possible way. Referring to the publications and theoretical speculations of Schwartz[3] and Sheehan[4], we find for the symmetrical arrangement of spheres of equal size:

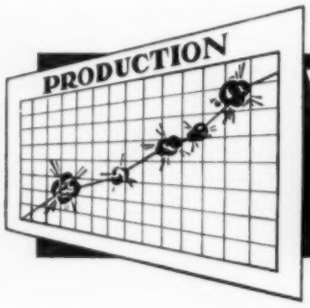
	Per cent
Open packing (cubic)—volume of spheres per unit volume	52.4
Close packing (tetrahedral)—volume of spheres per unit volume	74.1

The maximum compressibility for a sand of uniform grain size is theoretically 41.5 per cent. However, according to Sheehan, the mass of sand tends to arrange itself in a condition of close packing. This means that the compressibility should be almost nil under ideal conditions. In actual practice, however, the grains are neither round nor uniform in size. Nature does not supply completely compacted series.

Table II

New Factors

1. Number and relative amounts of ingredients
   a. Sands
   b. Binders
   c. Water
2. Influence of the mixing and processing itself
   a. Distribution of ingredients
   b. Modification of the primary factors of the binders (lubrication, viscosity, surface tension, etc.)
   c. Modification of primary factors of sand grains (size, shape, distribution, and surface condition)



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Our long experience is at your service if we can be helpful in suggesting ways to use your present equipment to better advantage. War-time demands naturally control production schedules, making it advisable to study future requirements as far ahead as possible.

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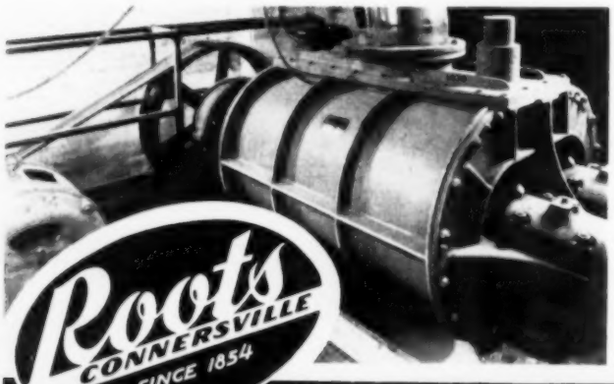

"R-C" Cupola Blower recently installed in a midwestern foundry. Capacity 2,700 CFM; 484 RPM; 20 oz. pressure.

ALL OUT for VICTORY

PUT YOUR SCRAP INTO THE FIGHT!

CUPOLA BLOWERS

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2. Kyle, P. E., "Flowability of Molding Sands", *Transactions*, A.F.A., Vol. 48, No. 1, Sept. 1940, pp. 175-189.
3. Schwartz, H. A., "The Significance of the Screen Test of Molding Sands", *Transactions*, A.F.A., Vol. 30, 1922, pp. 762-776.
4. Sheehan, J. J., "Core Shop Control", *Foundry Trade Journal*, Vol. 60, 1939, pp. 516-519.

This is the first of a series of two articles describing an investigation on the ramability, flowability and density of foundry sands. The second will appear in an early issue.

THE EDITORS.

Chose Coremaker

Emile Messmer, veteran coremaker of the Westinghouse Electric & Mfg. Co., Cleveland, recently was chosen representative worker by the war production committee of the plant out of some 1000 employes. To become eligible for election Mr. Messmer had to use at least 10 per cent of his earnings to buy war bonds, maintain a good safety and attendance record, submit an acceptable suggestion on war production, be willing to work when and where needed, and belong to a group specially cited for a production record. Mr. Messmer started to work for the Walker Mfg. Co. which later became part of the Westinghouse company, in 1896 on a punch press, and then learned to be a coremaker. Photo courtesy Cleveland Press

Magnus Chemical Co. Inc., Garwood, N. J., recently has organized a machine division for the manufacture of mechanical metal washing machines, pickling machines, driers, ovens, and burnishing equipment. The new division will be managed by Marcel Zinty, former manager of the firm's European factory.

Need Metallurgists

In the mobilization of manpower for the civilian war service of the government there is a continuing call for scientifically and technically trained men and women. Urgently needed are metallurgists, and the Civil Service Commission recently has announced two new examinations with modified requirements. No. 238 is for positions paying $2600 to $5600, and No. 254 for junior grade positions paying $2000. Announcements and application forms may be secured from any first- or second-class postoffice or from the Civil Service Commission, Washington.

Engineering Extension Department of Purdue University, Lafayette, Ind., recently has published the proceedings of the personnel and industrial relations conference held at the university in May, 1942, under the title, "Management's Personnel Responsibility for All Out War Effort." Problems discussed at the conference included: Mobilization of manpower; new skills for new supervisors; selective service and the labor supply; sources of labor; and women in industry.

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PRODUCING CASTINGS CENTRIFUGALLY

(*Continued from page* 70)

credit for this goes to the chill mold rather than the casting process; although, microscopic examination does show a very slightly finer grain for the centrifugal. This finer grain results in a greater strength, but again it is only a slight advantage. In this connection, however, the centrifugal does have one big advantage; namely, its consistency. There is much less chance of a hidden weakness than in any other type of casting, and that is all important today when an unexpected failure may prove very costly. When a bore and turn are both clean in a centrifugal casting, it is pretty certain that the molten metal between is solid and free from defects.

A third advantage which is desired in the machine shop, is that the bore and periphery are concentric, granted that the mold is machined true in the first place. Consequently, less stock need be allowed on the casting because there is no core which may shift slightly off center, but that is offset somewhat by the necessity of leaving more stock in the bore because of the accumulation of dirt there. In small castings, 3/32-inch on a side for finish should be sufficient, but this depends on the type of material being cast and how well the casting process is being handled. Naturally, the less dirt that appears in the bore, the less stock that must be allowed for finish.

The final advantage is the large increase in yield since there are no gates, sprues, or risers on the casting. That not only saves the remelting cost, but also keeps the foundry free from an accumulation of special mixes. The cleaning room will show a big saving as all that has to be done to a centrifugal casting which has been made in a permanent mold is to grind off the small flash that sometimes occurs between the cover and the mold, and the casting is ready for the machine shop.

Calculated Speeds Low

When it comes to the point of actually making a centrifugal casting, one of the first questions that will arise is what speed to use. Since the taper in the bore of a vertically cast piece depends upon the relationship between the centrifugal force and the force of gravity—the greater the speed the less the taper. By establishing a taper, it becomes possible to calculate theoretically the proper speed to give that taper.

Experience has shown that such calculated speeds are not great enough, and the speed must be increased to the point where the centrifugal force is about 100 times the ordinary gravity pull. This may be expressed as:

1. $F = 100\ M.$

where F = centrifugal force, and M = rotating mass

The equation for centrifugal force is:

2. $$F = \frac{Mv^2}{gr}$$

where F = centrifugal force; M = rotating mass; v = velocity in feet per second of center of gravity; r = radius in feet of center of gravity, and g = acceleration due to gravity

Combining equations 1 and 2 we get:

3. $$\frac{v^2}{gr} = 100$$

The velocity in terms of the radius may be written

4. $$v = \frac{R.P.M.}{60} \quad (2\pi r)$$

where R.P.M. = revolutions per minute.

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★ Six important features are found complete only in Tri-Ply Foundry Riddles. Each of these features adds to their efficiency and durability under the rigorous strain of day-in-day-out foundry practice. Check these six advantages, point for point, against the screening methods you are now using.

1. *Three-Ply Hardwood Rim* of laminated plywood will not split or splinter.

2. *No Crosswires* to slow the sifting process, and cause extra wear and tear.

3. *Smooth, Metal-Reinforced Butted Seam* eliminates bulky lap-joint. Stronger. Won't pry loose.

4. *Heavily Galvanized Wire Mesh* with full one-inch margin securely clamped between plywood rims and held by double row of clinched staples.

5. *Extra Heavy Three-Ply Hoop* stapled clear through rim and clinched on inside.

6. *Vertical Staples placed cross-grain* span more wood, hold tighter.

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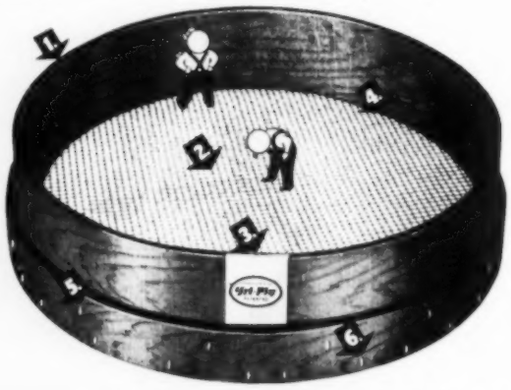
Tri-Ply Riddle Rims are made of 3-ply hardwood . . . will not bulge, break away, crack or leak sand through side of rim.



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By substituting 4 in 3 we get:

$$5. \quad \text{R.P.M.} = \frac{300}{\pi}\sqrt{\frac{g}{r}} = \frac{2655}{\sqrt{D}}$$

where D = diameter in inches

By plotting those data as curves as shown in Fig. 2 one can tell at a glance at what speed to operate for any given size bore. It should be stressed that the curves should be used *only* for thin wall castings, where the difference between inside and outside diameters is not too great. For instance, if a piece has a finish bore of 2 inches, we would select a speed of 1900 revolutions per minute; but now suppose that this same casting has a flange which is 6 inches in diameter. From the chart we can see that the centrifugal force at the outer diameter has increased to 300 times the gravitational force. Consequently, we should be forced to drop to lower speeds for sake of safety even if it results in more taper in the bore of the casting.

Outside Force Is Great

While we are talking about forces, it should be pointed out that the forces on the outside of the flask will be terrific, and they increase directly as the size. Therefore, not only must the design be strong enough to withstand the speeds contemplated, but in addition guards should be installed to protect the workman from the danger of a possible failure. Such a guard also will give protection from such flying metal as occurs from time to time.

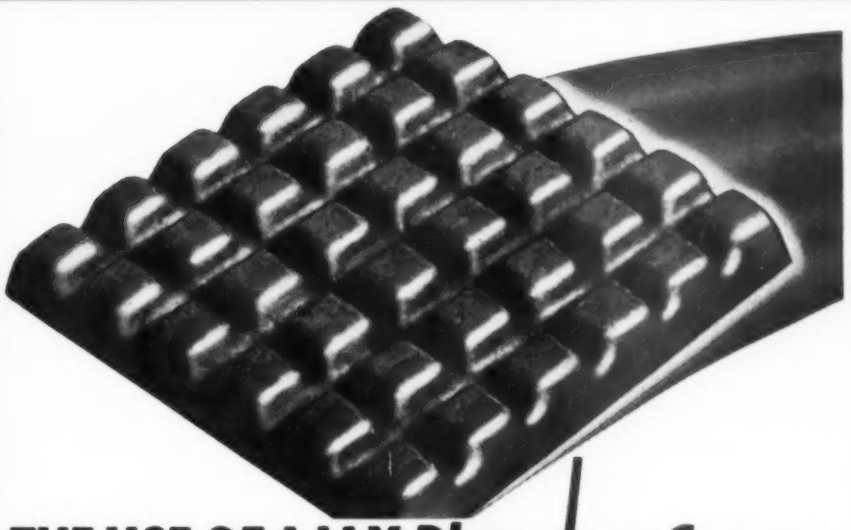
To illustrate this centrifugal force, let us take our casting with a 2-inch bore, and assume that it is just a plain bushing. From the chart, its speed will be 1900 revolutions per minute. Now further assume that the casting machine has the cover held on by fly balls which weigh 1 pound each and that the fly balls when operating are 5 inches from the center of the machine. At 1900 revolutions per minute, each fly ball will exert an outward force of 512 pounds.

Some writers have stated that they use 1700 feet per minute at the maximum diameter of any casting as a standard for determining their speed. However, as shown in Fig. 2, this curve is considerably different from the 100 G curve. Now we will not argue with anyone about a 10 per cent variation in speed, as we have not been able to find any difference in the quality of a series of castings which have been made over a small range of speed; but we have found that by operating as close to the 100 G curve as is practical, we have obtained our best results. No improvements have been noted when operating at speeds greater than 100 G.

Speed is not the only thing which affects the amount of taper in the bore. It is obvious that if the shaft of the casting machine is horizontal, the side walls of the bore will form a perfect cylinder; and as the shaft is tilted toward the vertical, the taper in the bore will gradually increase. From the standpoint of the buyer of centrifugal castings, assuming that he is buying them in the rough on a pound basis, he would prefer the straight bore as the weight would be less and the machining easier.

However, it is difficult to cast small articles with the shaft horizontal because first, it is difficult to introduce the metal fast enough and second, it is almost impossible to get the molten metal distributed correctly over the mold surface. The result is as usual, a compromise, and the best angle can only be determined by experience.

To make an intelligent surmise on the best angle for any job, it is necessary to understand just what happens inside of the mold. The first thing to keep in mind is that the metal must be introduced into the mold just as rapidly as possible, so that it will remain in one liquid mass as long as possible. That condition is obtained best with the shaft



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vertical and using a funnel shaped pouring spout—the throat opening of which is just as large as the bore of the casting being made will permit. But, merely getting the fluid into the mold cavity is only part of the story—just where in the cavity should it strike first?

At this point, you want to remember part of your sand casting technique, especially that part of gating where you attempt to get the flow of metal into the mold as quietly as possible. We will admit that in centrifugal casting there is considerable violent disturbance but the less you get, the better and cleaner will be your casting.

To avoid splashes onto the side walls of the mold which result in cold shots, the stream of molten metal should be directed against the center of the bottom of the mold where the rotational movement is the least, as shown in Fig. 8. The metal will remain at the bottom of the mold until it has had a chance to accelerate and get up to the same speed of rotation as the mold.

When the metal gets up to speed, it rises with an even rush up the side walls of the mold. In so doing, it carries the dirt and dross with it and leaves most of it in the upper part of the bore with the balance up against the cover of the mold. We might mention here that if the hole in the mold cover is the cast size of the bushing and an excess amount of metal is poured into the mold, most of the dirt will flush out through the cover when the metal rises. However, that is very wasteful because the metal is thrown off the machine in a very fine spray and will be oxidized almost completely.

A very interesting thing happens as the angle of the shaft is decreased—the dirt and dross begin to spread down the bore instead of being concentrated at the top as may be observed in Fig. 7. The best operating angle will be reached when the bore shows an even distribution of impurities over its entire length.

If the length of the casting exceeds four times the finished bore size, it becomes a long casting—and with a long casting, it keeps getting more difficult to have the metal strike the center of the mold. The spout will have to be changed at this point to a bent spout. But even with this type of spout, a point will be reached where it is no longer possible to strike the bottom of the mold, and then the dirt will all be concentrated at the very bottom of the casting.

Spout Must Be Smooth

There is one thing which is very important about a spout, and that is that the discharge end of it be perfectly smooth with no nicks or lumps, so that the metal will flow from it in a smooth solid stream. A small lip or obstacle will deflect part of the stream of metal and result in a poor outside finish on the casting.

For the funnel type spout, we use cast iron and the bent spout is a clay lined box with a short length of steel pipe welded to it and then the lining and pipe washed with a thin wash. The funnel type fits right into place in the guard while the other type requires a separate stand.

There have been many special spouts designed for making very long castings in a horizontal position. One of these was a spout which poured metal over the entire length of the mold at one time, and another was simply a trough which was the length of the casting and which would hold the entire charge and could be dumped quickly. In the manufacture of centrifugally cast iron pipe, retracting spouts are used. These consist of a long spout which reaches to the far end of the mold and when the pour is started, the spout is withdrawn from the mold at the proper rate so that the metal is deposited in the mold much like a coil of rope.

Thus far, we have been considering the

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pouring of centrifugal castings when the casting machine is running at a speed which gives 100 G. When bore diameters of 4 inches and longer are to be made, it is often necessary to change the procedure. At first glance, one would think that by operating at proportional speeds and angles, identical results could be obtained. We thought so until we tried it, but we had forgotten the element of time. We still think that if a large casting could be poured in the same length of time as a small one, the results would be identical but that obviously cannot be done.

The difficulty is the large amount of mold surface to be covered. On a large casting which we attempted to make and failed, calculation showed that even when pouring as rapidly as possible, we were putting in a layer of metal at each revolution that was only 0.01-inch thick. Consequently, the first layers were chilled before the next revolution, and this formed a laminated structure on the surface which flaked and peeled. Of course, more stock could be left on the outside, but that leads to a casting which has too heavy a wall thickness with spongy metal in the bore—a condition already explained.

Flows Slowly at Start

Actually, at the beginning of the pour, that condition is even worse, as the flow at the start is much slower for the first few seconds, and this initial metal forms very thin sheets all over the mold surface.

The remedy is to begin pouring with the machine at rest. When sufficient metal is in the mold to cover the mold surface completely with a layer thick enough so it will not chill between revolutions then start the machine. If too much is put in before starting the machine, a large pool of metal will collect in the lowest part of the mold and will roll around like a ball while being accelerated and will then start part way up the mold only to fall back into the pool again. This causes a considerable oxidation, and the inside of the casting will be very dirty. Once again, it becomes a matter of experience to tell just when to start up the machine.

This is a good place to point out that considerable power is required to start a casting machine, because the quicker the machine will come up to speed, the better. The power required to keep a centrifugal casting machine in motion is very low, but excess power is essential to assure quick starting.

Molds can be divided into three general groups namely, permanent, semi-permanent, and sand or core molds. Of this group, permanent molds are the most important because it is through their use that real saving in cost can be obtained.

We have tried many materials for use as molds, and to date we have found that graphite which we purchase in the form of electrodes for electric furnaces is the cheapest. If you take the total cost of a finished mold, by this is meant labor, overhead, and material costs, and divide by the total weight in pounds of good castings, that were obtained from that mold—the resulting figure gives you a true mold—cost figure in cents per pound.

Graphite is very easy to machine in a lathe and can be bored to any shape desired so its initial total cost is very low, as compared with the initial cost of a metal mold. When the costs are reduced to a pound basis, they are generally very close when the full life of the mold is utilized. For any amount less than the full life of the mold, the initial low cost of the carbon mold plays a big part.

We have also found that graphite molds are the only ones which can be used with such metals as 80-10-10 or those containing relatively high amounts of phosphorus. These alloys wet the

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mold surface and burn into the iron and steel molds, but will not fuse with the graphite mold. In addition, the metal lies more quietly against the graphite.

Graphite has another good quality—it has a very low co-efficient of expansion so the size of the casting made does not vary much with changes in temperature of the mold and the shape does not distort with repeated heat shocks as do metal molds.

There are two disadvantages to graphite molds. The first is its softness which results in rapid wearing of the walls of the mold as each casting is withdrawn, and the hotter the mold becomes, the easier it wears away. As this is purely physical destruction of the mold, the operator of the machine can extend the life of a mold considerably by taking proper care when he removes a casting. The longer a casting remains in a mold, the more it shrinks and the easier it is to remove so it does not pay to reduce the cycle too much.

The second drawback is the high heat conductivity of graphite. Both disadvantages can be offset partially by introducing powdered bentonite in the mold. This is done by blowing it in *axially* with a spray gun, and depending upon the centrifugal force to distribute and hold it on the side walls.

The powder does two things—it forms a thin insulating layer between the casting and the mold and also fills the worn and cracked sections of the mold, thereby keeping the molten metal out. It is this constant refilling of the imperfections in the mold surface with metal which causes the wear. A too heavy application of powder will work into the metal and cause lapping when the metal climbs up the walls, but a light application will remain on the mold during the casting and can be brushed off the casting. It is wise to blow out the mold after each casting.

The use of a wash in metal molds will do much to increase their life, but we have not yet found a satisfactory one. Our best results with metal molds have been with cold rolled steel and ordinary boiler plate.

We use a draft or taper in all of our permanent molds to facilitate removal of the castings. With an alloy which has a large shrinkage factor such as aluminum bronze, we allow ⅛-inch on the diameter per foot of length; while with the tin bronzes, the allowance is 3/16-inch. This can be varied with the length and diameters of the castings as experience shows. For example, on a 8 or 9-inch diameter aluminum bronze bushing that is not over 6 or 7 inches long, we would not have any draft.

Use Fire Clay Mold

Another classification of molds which can be called semipermanent has good possibilities. This would be a mold which is made with a pattern, but from which two or more castings can be obtained. Such a mold is desirable when there are not enough pieces to be made to justify a permanent mold. We have just started on this problem, but have had good success using fire clay in the place of sand. We have obtained as high as 4 castings from such a mold without any apparent bad effects on the mold itself.

The final mold type is sand and from the standpoint of casting, it is ideal because of its insulating properties. We have obtained very good castings using baked core sand molds, but they always result in an increase in cost. The mold itself, especially if blown, can be made very cheaply, but the difficulty of removing the casting and sand, the increase in casting time because of slower solidification, and the necessity of cleaning the casting bring the cost of the casting up to about the same as that of the ordinary casting.

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esting centrifugal casting machine for making cast iron liners for tractor engines. Green sand is used and each mold is formed right in the casting machine. The machine is started and a measured quantity of sand is dumped in. A sizing ram is forced through from the back of the mold, thereby leaving a straight smooth bore which is still loosely packed on the inside. A forming mandrel then is introduced through the hole in the cover. The mandrel is mounted on an eccentric so that it can be brought up against the sand which is then compressed to conform to the shape of the mandrel. The mandrel then is withdrawn, a pouring spout set up, and the casting poured. When the metal has set, the machine is stopped, the cover removed, and the previously mentioned ram is used to eject both the casting and the sand.

Two Methods Available

In centrifugal casting without a center core, the size of the bore is determined by the amount that is put in, except in the case where too much is put in and then the size is determined by the hole in the cover. Two methods are available—by volume and by weight. For small castings, volumetric measurements are the easiest to make as all that is required is a series of laboratory crucibles in a range of sizes—we use from No. 0 up.

Some provision must be made for keeping them hot while in use. Hanging them over the furnace will do, but a small gas fired oven is more satisfactory. When a heat is to be broken up into 2 or 3 castings, the best way to get the amount is by weight. The ideal way is to make the heat of the proper weight in the first place and then when it is ready, simply pour the entire heat into the mold. This method gives the least metal loss, but it is not practical for small castings.

The procedure of pouring the metal into a measuring ladle, then into a spout, and then into the mold itself naturally raises the question, "What temperatures are required?"

In general, it can be said that at the instant the metal is entering the mold, the temperature can be somewhat *less* than that used in conventional castings. Since there are actually three pours made, each of which will reduce the temperature about 50 degrees Fahr. not to mention the loss in the measuring ladle, the furnace temperature must be 100-150 degrees hotter than would be used for sand casting. For aluminum bronze, we use 2100-2200 degrees Fahr. while the tin bronzes not over 2100 degrees Fahr. When the furnace temperatures are too high, a large amount of oxide will show up in the bore, so it is easy to tell if excessive temperatures are being reached.

That leads to another problem—the length of time that the metal must be held in the furnace. When you are working with sand molds, it is possible to make up enough molds to take an entire heat, but in centrifugal casting you are limited to the number of machines that you have and each machine can make only one casting at a time. Between the higher temperatures required in the furnace and the length of time that the metal must be held at that temperature, the metal losses will be high; and what is even worse, the analysis may be way off by the time that the end of the heat is reached.

Having recognized the problem, there are several things that can be done to reduce it.

1. Make sure that the temperature in the furnace is as low as possible to make sound castings.

2. Do not make up too large a heat for the size casting being made.

3. If you have more than one machine, arrange the work so that a large casting

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is being made in one machine.

4. Add more machines, but this has a limitation because the metal cannot be carried too far without losing too much temperature.

5. Conserve heat at all possible points by maintaining the ladles and pouring spouts as hot as possible, and making the pours as smoothly and rapidly as possible.

6. If test bars are not required and ingots are being used, by adding ingots at regular intervals a continuous operation can be set up which will give consistent results.

We have attempted to point out the ends to be desired, and the pitfalls which may be encountered on the way. If you attempt centrifugal casting, you will have your problems, but by keeping three fundamentals in mind you will be able to overcome them. Those are:

1. A uniform and quick distribution of molten metal over the entire surface of the mold.

2. Progressive solidification of the metal.

3. Final accumulation of all the dirt and impurities in the bore where they can be removed by machining.

If the casting is not good, one or all three of those fundamentals is not taking place.

This article is from a paper presented by the author at the Regional Foundry Conference held early this year at Hotel Schroeder, Milwaukee under the joint sponsorship of the Wisconsin Chapter of the A.F.A. and the University of Wisconsin.

THE EDITORS

Safety-First and All the Time

(*Concluded from page* 71)

understood to prevent accidental starting of machines and motors at unexpected times by persons not knowing what the push button is for. The men who protect themselves with knowledge of how things work and wherein lies danger, and pass this information on to all the men concerned, are really the safety men that must be relied upon to keep casualties low.

The lack of alertness is responsible for most accidents. The accident record of the day after a vacation shows that those returning to work after proper use of the day or days off were alert and free from accidents. Those who spent their time in debauchery, barely able to return, were the ones who suffered mishaps. Are we going to let careless habits be the partner of Hitler and Hirohito to knock us off balance?

In discussing safety with an outstanding employee of another industry, who has just completed 15½ years continuous service without the loss of one hour's time through accident or sickness, I found that his health habits and hobbies were such that he returned to work each day wide awake and always alert. This record is hard to equal. As a nation we have been living a riotous life and man for man are weaklings compared with our adversaries. Any one who has trained for athletics knows that months of training and careful habits are required to attain perfection. Why then should we have armies of workmen in such shape that they hardly can complete the day without becoming accident makers.

This article is from a paper presented by Mr. Potry before the 1942 All Ohio Safety Congress.

THE EDITORS

Olin Hall of Chemical Engineering, new home of the School of Chemical Engineering, Cornell University, Ithaca, N. Y., will be dedicated Oct. 3. Because of the war, exercise will be brief and informal, but a group of distinguished industrial and educational leaders will be present for the occasion.

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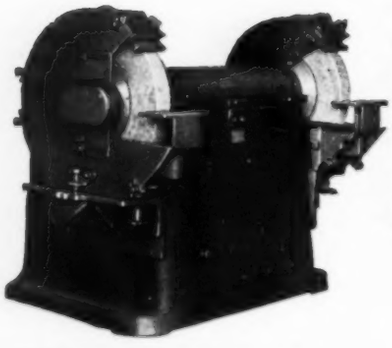

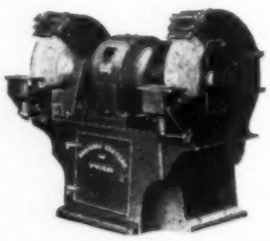

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APPLYING ATMOSPHERIC PRESSURE

(*Continued from page 77*)

an ever increasing number of castings are being made wholly or partly by this means, typical blind risers will be discussed in detail. The casting-riser system shown by the sketches in Figs. 5 and 6 for the sake of clarity illustrates the practical application of the process. The casting, which is 2 x 4 x 10 inches is representative of a valve flange or some similar section. As to nomenclature the channel AA Fig. 5, leading from the downgate to the head will be the "ingate" and CC leading thence to the casting will be referred to as the "neck." This follows the terminology of most shops familiar with blind head feeding.

The sketch shows the casting actually 5 inches higher than the top of the blind head to indicate that it is not necessary for the riser to be as high as the casting. In the manufacture of average commercial castings, such as valves, for which the blind head is well suited, this situation seldom exists. In general the mass of the flange or other section is great enough to require a blind head very nearly as high as the part it is to feed. In these examples, as in blind risering in general, the metal poured into the ingate should flow through the riser into the casting.

Metal Loses Temperature

As soon as the mold is filled completely, the metal loses temperature rapidly to the sand and a skin of solid metal quickly forms at the mold-metal interface. This initial skin formation is shown as the cross hatched areas of the illustration. As temperature continues to drop, more and more metal solidifies tending to form a partial vacuum within the solidifying mass. The skin forming on all parts of the casting is impermeable except at the desired spot on the riser. As solidification continues in the casting, the atmospheric pressure acts like a piston on the metal in the blind riser forcing it into the casting continually as it is needed to feed shrinkage. Shrinkage constantly is creating the necessary partial vacuum in the casting and atmospheric pressure, acting through the medium of the molten metal in the riser, is constantly relieving it. If solidification proceeds properly, with the parts most remote from the riser freezing first and progressing thence toward the riser, each successive amount of shrinkage is compensated by additional fluid metal forced in from the riser. The ingate, being small, freezes off first and completes this part of the closed system. It is readily apparent that proper heat gradients must be maintained at all times. With blind risers this is much easier to do, than with open risers. Fig. 7 shows the side view of a typical method of feeding a valve flange with a blind riser. The sketch is self-explanatory.

Several means can be used for keeping a blind head open. As a matter of fact in cases where very hot metal is used and an early feed demand develops in the casting the riser may break through without any artificial means being provided. However, this is far too uncertain to depend upon. A sharp wedge of sand may be molded into the top part of the riser and in many cases this method is satisfactory. The sharp edge of the wedge of sand sticking down into the metal supplies the necessary hot spot but as in the case above cold metal and late feed demand may often combine to cause this method to be ineffective.

Use of thermit, either made up as a core or held in readily melted metal tubes, placed at the top of the riser has been found satisfactory by some foundrymen and actually increases the efficiency of blind risers by the exothermic

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addition of heat. The material is expensive and this method may not become popular for that reason. These methods have all been tried at the Naval Research Laboratory with the results reported and none appeared to function with the same degree of certainty and simplicity as the dried sand core.

This method was developed by the Dodge Steel Co., Philadelphia, and consists of imbedding a round dried sand core in the sand at the top of the blind riser so that it extends into it for a distance roughly equal to the radius of the riser in the manner shown in Fig. 7. This is a simple rod core of a type found in the average foundry, except that a small vent hole extends through the center. This vent hole is not absolutely necessary but is recommended. The only provision is that the core be made sufficiently strong and refractory to withstand the pressure and temperature of the molten metal, and permeable enough to allow passage of gas. A more recent type of core developed by one company is conical in shape and is rammed in place at the time the mold is made. The core is first placed in a suitable hole in the top of the riser pattern and left when the pattern is drawn.

Further development may in time bring to light other methods even more useful for certain applications. Several methods have been tried but have proved either more complicated or more expensive than the simple core. In action the core breaks the seal which would otherwise form completely over the riser by extending into the center where there is still liquid metal. Thus atmospheric pressure, acting through the permeable core, is able to force the metal from the riser into the partial vacuum tending to form within the casting proper.

As mentioned before the sand of the mold is sufficiently permeable to allow an easy passage of gas to and from the core so that the full benefit of atmospheric pressure is realized. It has not yet been determined definitely whether the gas generated instantaneously by the core is necessary to initiate the contact with the atmosphere but it is added assurance.

Present Certain Advantages

Some of the advantages which make blind risering desirable whenever possible are:

1. Hotter feed metal in the risers as a result of being able to gate through them into the casting. The sand around the riser is preheated by the metal flowing through. Also the last metal to enter, and hence the hottest, is in the riser where it should be.

2. Bottom gating is fully practical thereby reducing sand erosion and at the same time promoting proper heat gradients. This is not as practical with open risers because bottom gating then gives reversed temperature gradients.

Fig. 16 shows how temperatures can vary between the upper and lower sections of even small bottom poured castings. The casting is self-explanatory and Fig. 19 records the spiral lengths graphically as a function of their position above the ingate. This shows how rapidly metal cools when open risers are bottom poured and explains how the efficiency of these risers may be impaired. The practice of visiting large open risers in turn after the casting is poured with the intention of promoting proper heat gradients only partially corrects the reverse effect of bottom gating and at the same time may be harmful by driving dirt or dross downward into the main body of the casting where it may be trapped.

3. Saving in cleaning cost by being able to put the risers on flat surfaces and at any position necessary in the mold. Because of this less padding is necessary and the neck is relatively small because of the increased efficiency of the system.

4. Increased yield through more economical feeding. Since a sphere has the lowest surface area to volume ratio of any geometrical form it is the most efficient shape of feeder which is pos-

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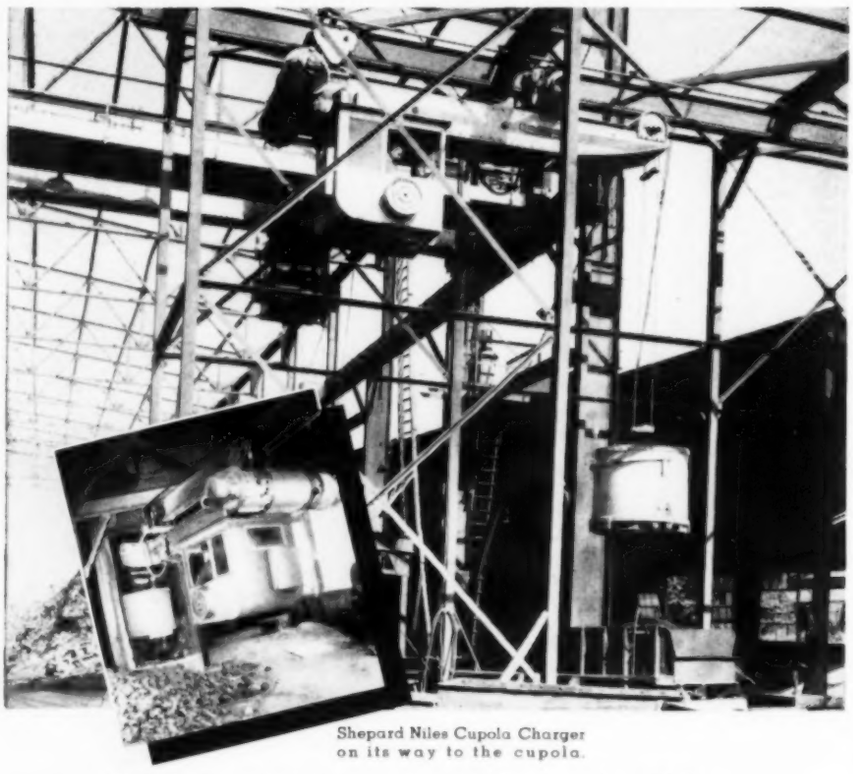

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sible to use. The semispherical top and cylindrical shape of blind risers approach the ideal design of feed head. Since they are encased in sand, air currents do not cause rapid chilling. Also, it is probable that the hemispherical shell of metal formed on top of the riser at the sand metal interface actually reflects heat and decreases the cooling rate of the metal in the riser.

5. More solid castings because blind heads can be placed wherever needed. This makes it impossible to have sections "beyond the range of feeding."

Determine Feeding Zones

One very important thing to remember in using blind risers at different levels in the same casting and depending upon the atmospheric pressure for their proper behavior, is that a particular zone of feeding must be relegated to each head. Fig. 20 is a sketch showing the necessity for this precaution. The open riser used in this particular case would react similarly if it were a blind type at the same level. The sketch represents roughly an actual casting in which the blind riser failed to function. Cavities were found in the casting and risers in the position shown. This resulted because both risers were initially open to the atmosphere and the net advantage of the blind riser in this respect was zero. Due to the greater ferrostatic pressure of the open riser, because of its superior position, the metal was forced through the system to actually feed the blind riser. By the time the narrow section of metal shown at *c* had solidified and shut off the liquid contact between the two feed heads metal had solidified beyond the end of the sand core and made it impossible for atmospheric pressure to act.

The section to be further fed was choked off at *c* and solidified with the shrinkage shown. The casting could have been made perfectly sound without altering the method of heading in any way. The only change would be to place external metal chills, cast to shape, around the neck of the casting at point *c* to chill the metal at this point, separate the two heavy sections, and allow each riser to function independently of the other.

Figs. 17 and 18 show castings made with blind risers at the Naval Research Laboratory. The casting of Fig. 17 was made as shown and the mold was tipped to an angle of about 30 degrees with the riser at the lowest level. In this way the mold filled with a minimum of turbulence and surface lapping. The ring was 17 inches in diameter, 3 inches high and 1½ inches thick fed with a riser 7 inches high and 6 inches in diameter. The casting was sound when x-rayed and machined. Fig. 18 is a pressure tight instrument housing which was sound when made as shown.

The purpose of this article is to acquaint foundrymen with the possibilities of making use of atmospheric pressure in the foundry to prevent defects and to increase the efficiency of risers. The foundry principles involved, as well as a detailed description of the use of blind risers has been offered by the authors in *Transactions* of the A.F.A. September, 1942.

It should be clear by now that prevention of the defects discussed in early paragraphs is simple indeed. The answer is, of course, provision of adequate feed metal, and insurance that risers are kept open to the atmosphere. The simple principle is to localize shrinkage in a feeder which can be removed and discarded rather than allowing it to occur in isolated places in the casting proper. The shrinkage cavity which occurs where ingates join to the casting can be prevented by gating through a blind riser at this point. Fig. 21 shows one example of how this principle has been applied at the Naval Research Laboratory. The small riser placed as shown serves the double purpose of preventing the defect and of acting as somewhat of a skim gate to collect dirt or dross

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originating ahead of the ingate. Small cavities were very often found in the casting just beyond the ingates until this method was adopted after which no further trouble was experienced.

All of the castings shown have been made of steel but it would seem that the principle applies equally well to other metals. Blind risers at ingates have been found useful for making castings of aluminum, cast iron and certain bronzes but how far its use can be extended in these fields has not been determined. A. H. Hesse's observations on nonferrous castings at this laboratory indicate that the width of the solidus-liquidus range may influence the efficiency of blind risers on bronzes and certainly the rate of build up of skin strength in sections of castings higher than the risers has an effect. Blind risers do not function properly on steel if it is slightly rimming as back pressure due to gases escaping from the metal and the late or absent feed demand cause them to be ineffectual.

If it is recognized that atmospheric pressure is not a panacea for all gating and risering problems but that it can be so used as to cause good or bad castings depending upon how well its principles are understood and applied, then the foundry industry has made another step forward.

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(*Continued from page* 82)

section of the furnace for the precipitation heat treatment. Temperature used is 450 degrees Fahr., and the time required is about 6 hours. At the end of that time the castings are taken from the furnace and allowed to cool in the air. After cooling the castings are abrasive blasted in a table type machine. Then they are inspected carefully and sent to the shipping department for transportation to the machine shop for further processing.

With the vast amount of materials used in the production of cylinder head castings at the new Wright Aeronautical Corp. foundry reclamation is an important item. Principal systems used are for reclamation of sand and of metal. That for sand recovery will be described first. As previously mentioned sand removed from the castings during knockout or cleaning falls to the floor in the cleaning department. That sand is shoveled into hoppers in the floor which direct the sand on to a long conveyor belt in a tunnel extending across the foundry.

Prepare The Sand

From the conveyor belt the sand goes into a core breaker screen which disintegrates the large lumps. The sand then falls onto another conveyor belt which travels over a magnetic pulley. Ferrous material, such as wires and chills previously missed, are recovered at that point and are returned for reuse. After passing over the magnetic pulley the sand drops on an elevator belt which carries it up approximately 3 stories to a secondary crusher where all lumps in the sand are pulverized.

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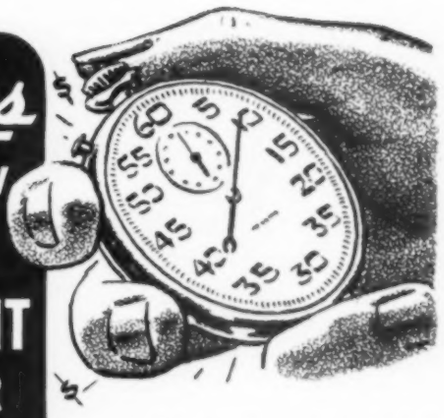

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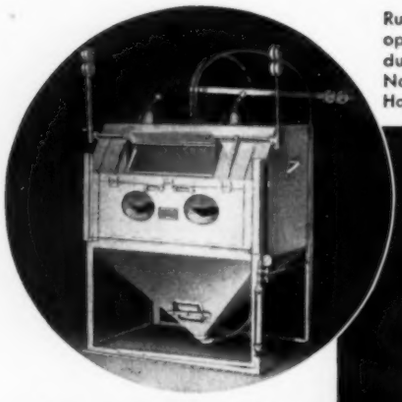

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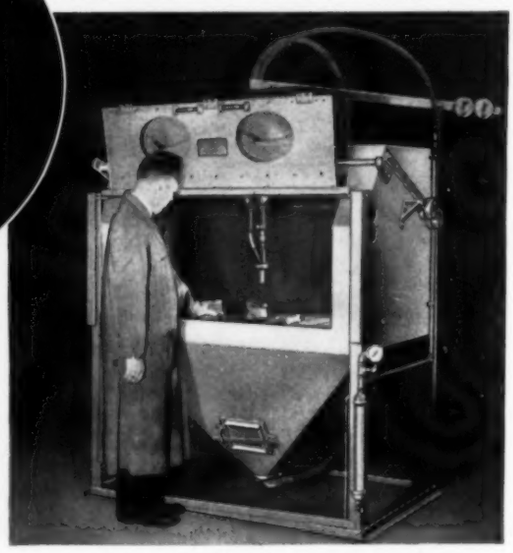

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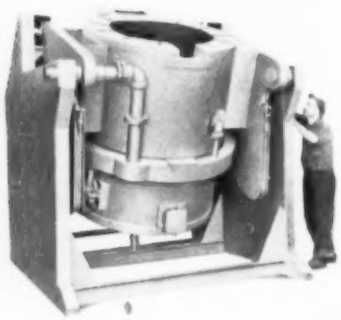

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Approximately 45 per cent of the poured cylinder head weight is contained in the gates and risers. In many foundries that material would be classed as foundry returns or home scrap and a certain amount would be placed with ingot metal in the melting unit for one of the succeeding charges. However, it has been found more advantageous at the Wright corporation to remelt the gates and risers, chlorinate, and cast into ingots. Spills, fins knocked off in cleaning, sweepings, grindings, turnings, etc., also are remelted and cast into ingots, but are handled separately.

Remelting is performed in a reverberatory type furnace fired with oil burners. The furnace has a capacity of 15,000 pounds, and the gates and risers are melted down at approximately 1250 degrees Fahr. When the entire bath has reached that temperature it is skimmed carefully and then chlorinated through graphite tubes from 6 to 10 minutes. Following chlorination the temperature of the bath is raised to 1275 degrees Fahr., and sufficient magnesium is added to replace that lost during both melting operations. Then the alloy is cast into ingot molds carried on a conveyor, as shown in Fig. 23.

Remelt Poured Into Ingots

The mold conveyor carries the ingots through the wall of the furnace room into the metal storage. Each lot of remelt is marked and after chemical tests show it meets standard requirements, the metal is ready for use. Spills, sweepings, etc., are treated in a similar manner in another furnace similar to that described. However, since much of that material contains considerable dirt, its reclamation requires considerably more time. Due to the fact that much of the spills, sweepings, grindings, etc., is in a finely divided condition, such material must be handled carefully to reduce oxidation losses.

A bath of molten metal is maintained in the furnace and from time to time small batches of the fine material are added and rabbled into the bath as rapidly as possible. By that procedure the temperature of the bath is not reduced to any appreciable extent, and the grinding and turnings are not exposed to the furnace gases longer than necessary. The rabbling operation also aids in coalescing and bringing any dirt and dross to the surface of the bath where it may be skimmed off easily.

This is the second and concluding article of two describing the production of aluminum alloy cylinder heads for airplane engines. The first appeared in the September issue.

THE EDITORS.

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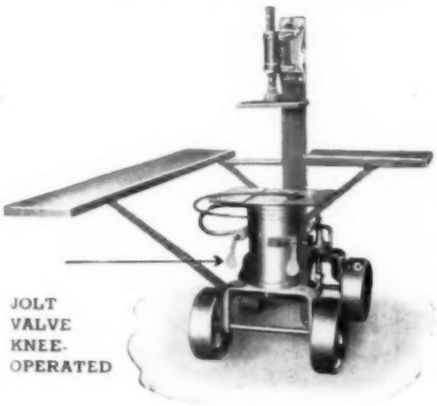

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PROPERTIES OF LOW TIN ALLOYS

(*Continued from page* 85)

of hot sea water apparently reduces the rate of attack over that experienced in cold water; although the degree of attack is appreciably greater than that experienced in fresh water. Care should be taken when utilizing gunmetals for handling softened boiler feed waters to keep the zinc content as low as possible.

Foundry Characteristics — Gunmetals of the 88-8-4, 86-7-5-2 and 85-5-5-5 types are no more difficult to handle in the foundry than standard admiralty gunmetal. As a metter of fact, both 86-7-5-2 and 85-5-5-5 possess superior castability and are particularly adaptable to the production of pressure castings in large numbers. Similar pouring temperatures to those employed for 88-10-2 (1160 to 1180 degrees Cent. for test bars) give perfectly satisfactory results with the other alloys under review, as will be observed from the test results taken from production melts, all sand cast, made by the Phosphor Bronze Co. Ltd., as given in Table IX.

Shrinkage Is Uniform

Patternmakers' shrinkage for all the alloys is around 3/16-inch per foot. It should be noted that there is little danger of lead segregation occurring in gunmetal containing up to 6 per cent lead, so far as castings of average section (up to 1¼ inches) are concerned, but this point will have to be watched in heavier sections, particularly when using 85-5-5-5.

Machinability—The machinability of 88-8-4 gunmetal will be similar to admiralty gunmetal, while 86-7-5-2 and 85-5-5-5 will tend to be slightly better.

Soldering and White Metalling—All the alloys under review are soldered readily and white metalled.

Brazing and Welding—Brazing by the usual methods should be quite successful with all the gunmetals mentioned.

Welding operations on gunmetal are difficult to conduct due to the extreme heat fragility of the alloy and the production of zinc fume. Satisfactory results are most likely to be obtained by the use of the metallic arc process, using phosphor bronze type electrodes, as made by the leading electrode manufacturers, in conjunction with preheating. With these electrodes 88-10-2 and 88-8-4 should give good results in "building up" or repair welding. In the case of gunmetals of the 86-7-5-2 and 85-5-5-5 types welding operations become in-

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creasingly difficult and it may be more practical to adopt oxy-acetylene brazing methods, using filler rods of the Sif-Bronze type. The carbon arc process could also be employed in many cases, using phosphor bronze filler rods, containing 3 to 10 per cent tin and about 0.3 per cent phosphorus. Again, alloys 88-10-2 and 88-8-4 should give fairly good results, but 88-7-5-2 and 85-5-5-5 types will be more difficult. In general, the success of the process depends to a large extend on the soundness of the castings, gassy castings being almost impossible to weld without the production of gassy welds. The high thermal conductivity of gunmetals frequently renders the oxy-acetylene welding process difficult.

Applications—Examples of suggested applications for the modified gunmetals are outlined in Table XI.

Part 2—Cast Brasses (Types A and B)

Mechanical and Physical Properties—The mechanical properties at room temperature are included in Table V. Cast brasses types A and B are not recommended for use at elevated temperatures and there is no published data available of their mechanical properties. The general remarks on mechanical properties at sub-zero temperatures given for gunmetals can be applied to the cast brasses. The effect of low temperatures is not likely to cause any serious change in mechanical properties, apart from some reduction in ductility. For their general physical properties see Table VIII.

In general, the corrosion resistance of these alloys in sea water is not quite so good as the gunmetals, but in contact with petrol or fuel oils containing sulphur their resistance is much greater. Care must be taken when applying the cast brasses to industrial applications to prevent the possibility of "dezincification" arising. This is best avoided by the use of alloys containing not more than 20 per cent of zinc and in addition the presence of at least 0.03 per cent of an inhibitor, either arsenic, antimony or phosphorus.

Lines[8] recently established corrosive conditions that resulted in complete "dezincification" of 0.35-inch diameter plain 70-30 and naval brass rod in a period of 10 weeks. Under similar conditions the same alloys, modified by about 0.03 per cent of arsenic, antimony or phosphorus, did not dezincify nor did corrosion progress along the grain boundaries.

The test results on the uninhibitive naval brass are of interest. It is fairly well established that the 1 per cent of tin associated with this alloy is a retardant of "dezincification." The results of Lines' work are in agreement with this statement when temperatures of around 70 degrees Fahr. are involved. At 150 degrees Fahr., however, it was found that tin was without influence on the rate of the dezincification reaction. Dezincification is encountered with corrosive water supplies in plumbing work with alloys such as muntz metal, containing 60 per cent copper, 40 per cent zinc, and with brasses containing 67 per cent copper, 32.5 per cent zinc, 0.5 per cent lead. It is particularly serious at hot water temperatures, resulting in some cases in very short life of the installation. In condenser tube applications for marine power plants and the oil industries, dezincification occurs with naval brass containing 70 per cent copper, 1 per cent tin and 29 per cent zinc.

In view of the foregoing remarks, it will be advisable to utilize cast brass, type A, for those castings required to resist corrosion, keeping composition as far as possible to the 80 per cent copper end of the specification, and to include preferably 0.03 per cent phosphorus,, as an inhibitor. The presence of around 1.0 per cent tin will also be of benefit in minimizing corrosion. Cast brass, type B, should be reserved for applications not subject to corrosion or where a protective coat of paint can be readily applied.

Easy To Handle

Founding Characteristics—Cast brass, type A, has good castability, and is not difficult to handle in the foundry. It is suitable for small pressure work and the best results are obtained in this direction at the 80 per cent copper end of the compositional range. The presence of tin and lead assists the production of sound castings, but care must be taken to exclude aluminum as far as possible. Over 0.01 per cent of this element will produce excessive porosity. The production of brass castings also entails the use of more permeable molds than used for gunmetal, particularly as regards green sand work. Gating and feeding methods required are similar to gunmetal.

Cast brass type B, is more difficult to handle, particularly as the 62 per cent copper end of the compositional range is approached. As most of the supplies of this material will be obtained from scrap, it is possible that manganese will also be present from time to time, and it will, therefore, be advisable to handle this alloy in the foundry along similar lines to manganese bronze, taking the precaution of providing heavier gates and riser than one would normally allow for gunmetal. The presence of maximum tin and aluminum contents allowed will tend to aggravate troubles due to the above and promote brittleness.

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Test bars taken from production melts by the Phosphor Bronze Co. Ltd., gave the results present in Table XIII.

A guide to suitable pouring temperatures is given in Table XI.

Patternmakers' shrinkage will vary from 3/16 inch per foot for cast brass type A, up to ¼ inch per foot for type B.

Machinability—The machinability of both types A and B cast brass is excellent.

Soldering and White Metalling—Both the cast brasses under review are readily soldered and white metalled, even with the maximum allowed aluminum content of 0.25 per cent.

Brazing and Welding—Brazing by the usual methods should be quite successful except in the case of type B brass, when considerable care will be necessary when the copper content is at the low end of the range and a high melting point brazing spelter is used. Welding operations conducted on the cast brasses should give little trouble with the oxy-acetylene process, using an oxidizing flame and brass filler rods of the Sif-Bronze type. Electric welding is not recommended.

Applications—Examples of suggested applications for cast brass, types A and B, are given in Table XII.

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[6]"Rules for Construction of Unfired Pressure Vessels," Section 8. A.S.M.E. Boiler Construction Code, 1940 edition.

[7]J. Strauss, "Metals and Alloys for Industrial Applications Requiring Extreme Stability." Transactions of the American Society Steel Treating, 1929, Vol. XVI, p. 191.

[8]W. Lines, "Prevention of Dezincification," *Metal Industry*, Oct. 31, 1941.

This is the second part of the *Reports on Low-tin and Tin-free Bronzes and Brasses* prepared by members of the Nonferrous Subcommittee of the Technical Committee of the Institute of British Foundrymen and presented at its thirty-ninth annual conference held in London on June 20. The first part of the report on silicon bronze alloys appeared in the September issue.

The Editors.

Executive sales office, Columbia Division, Pittsburgh Plate Glass Co. has been moved to Pittsburgh from New York, including the chemical division's traffic and advertising departments. W. I. Galliher, director of sales for the chemical division, will be in charge of sales activities from the new Pittsburgh headquarters.

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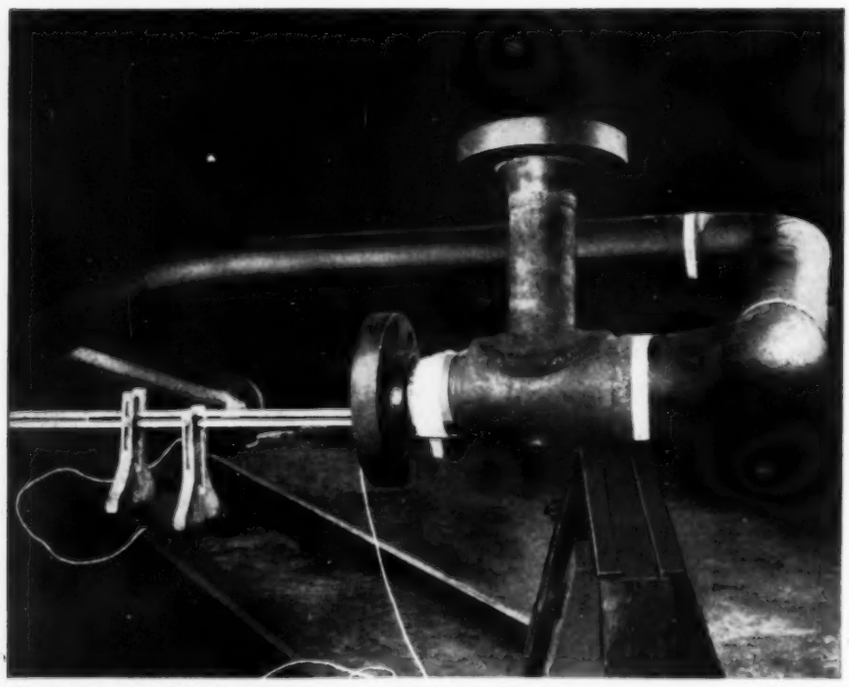

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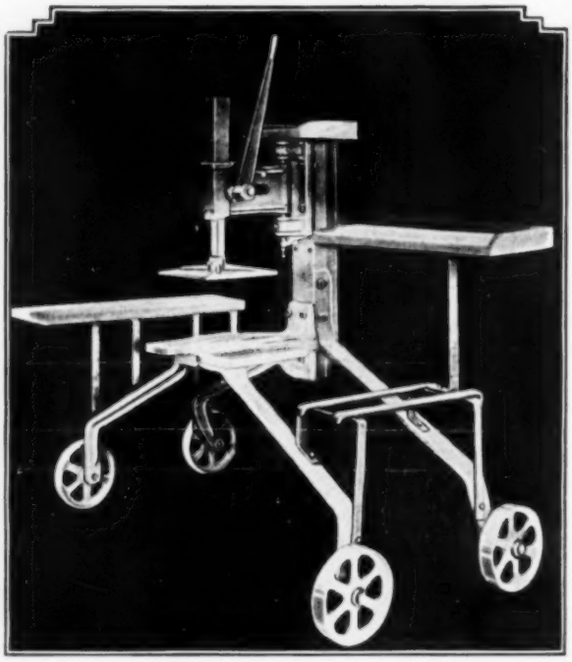

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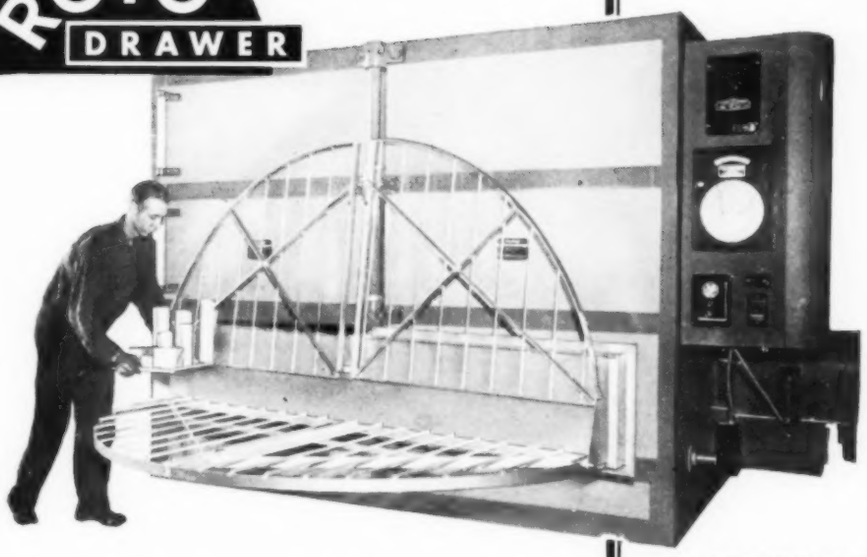

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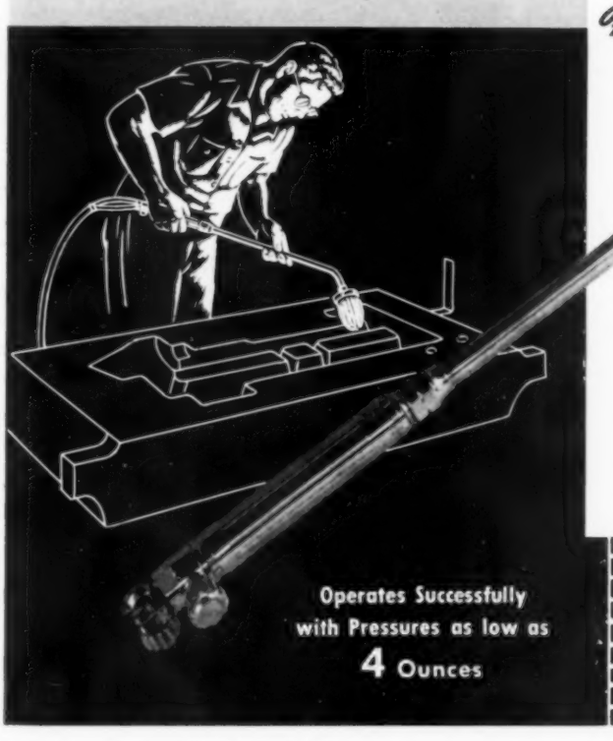

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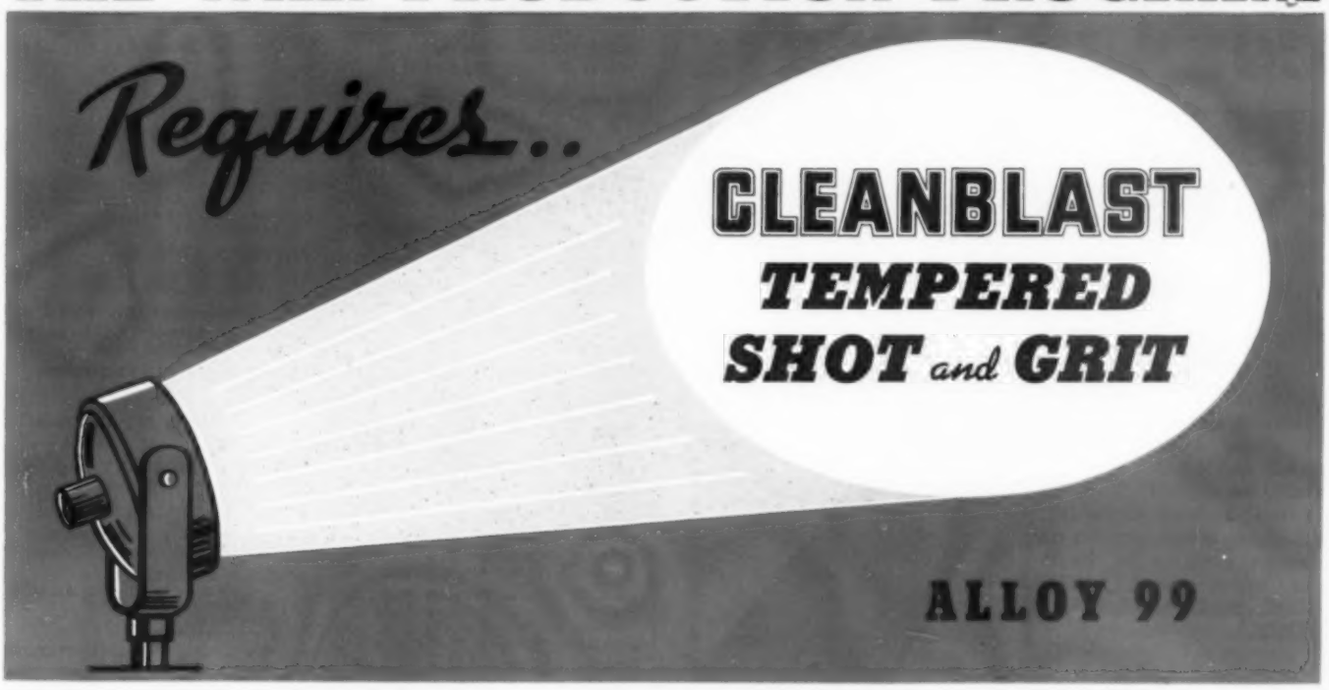

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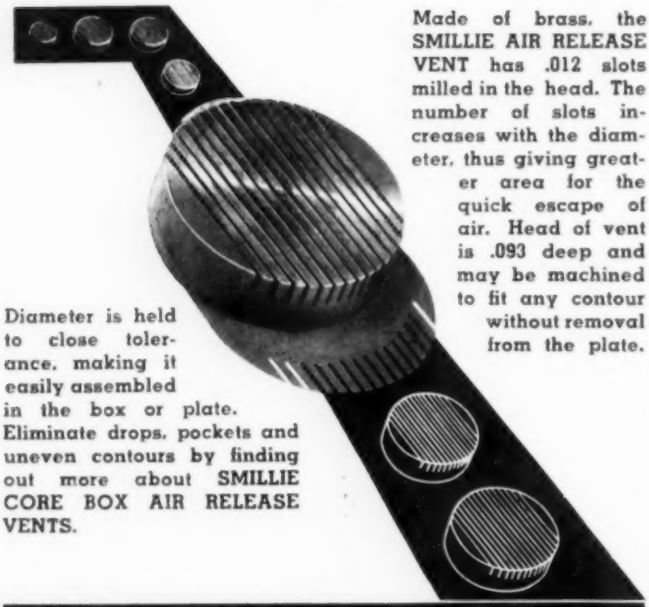

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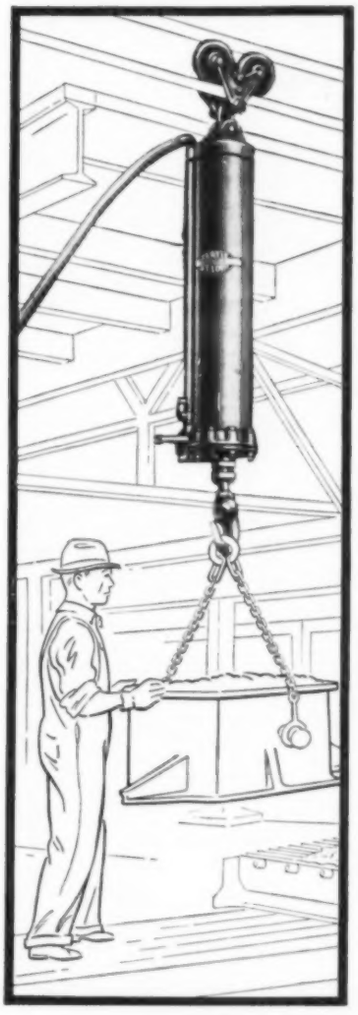

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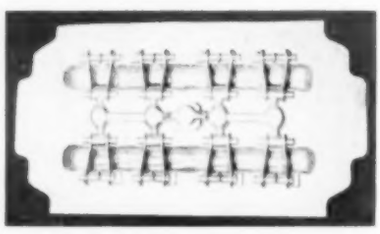

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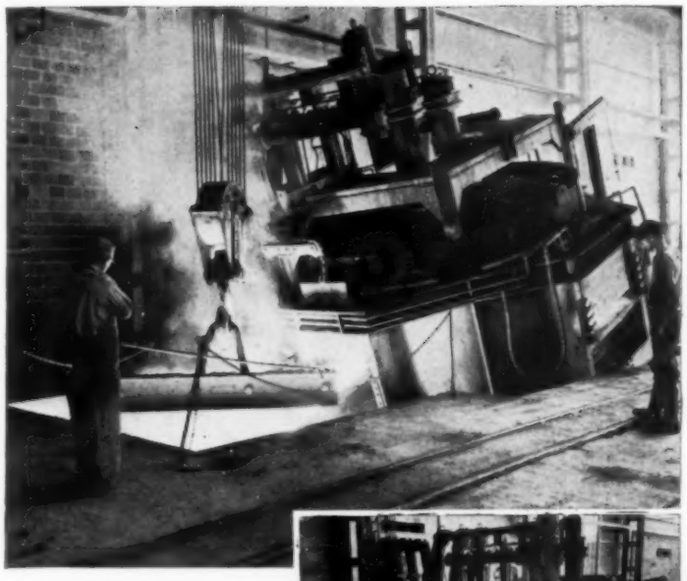

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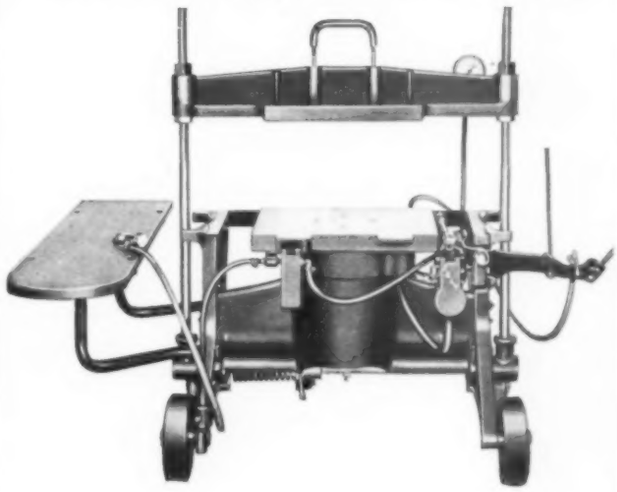

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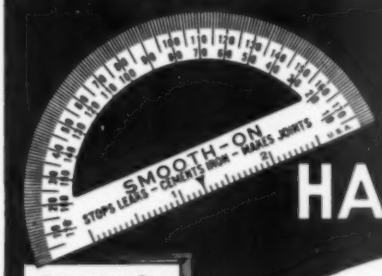

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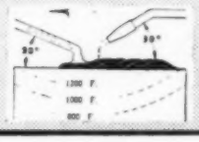

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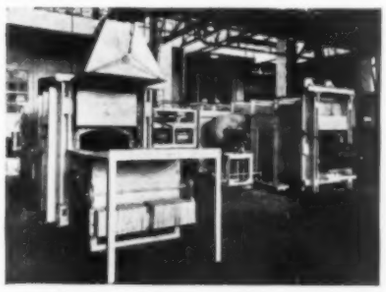

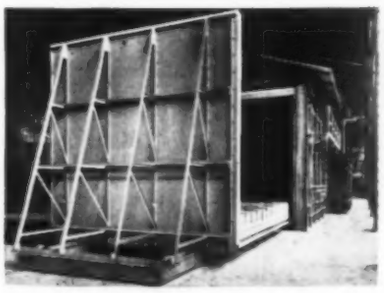

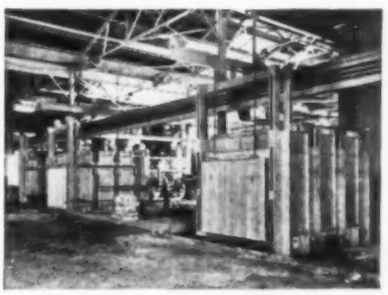

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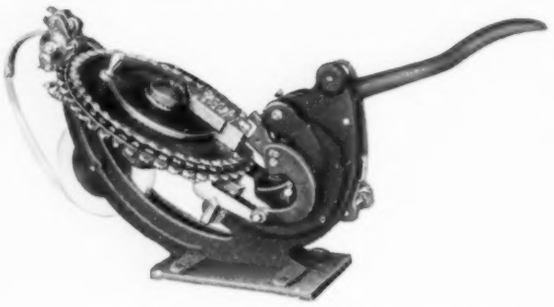

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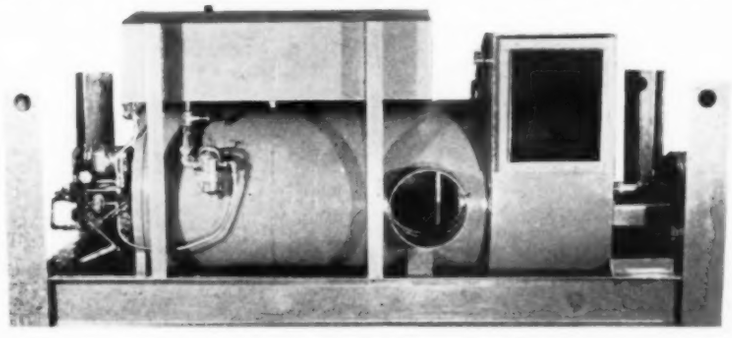

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OCTOBER
1942

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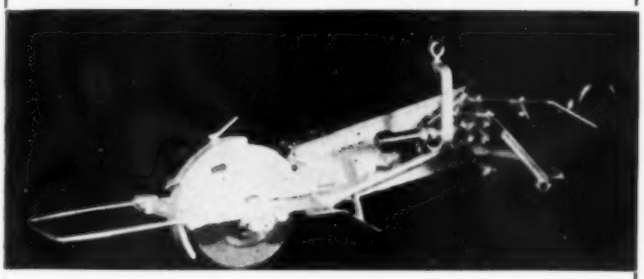

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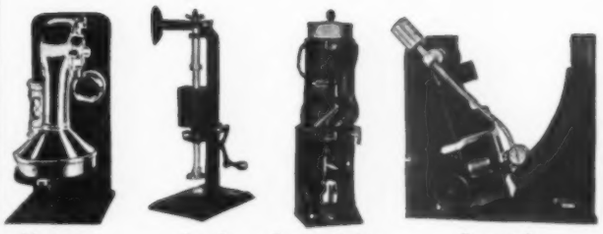

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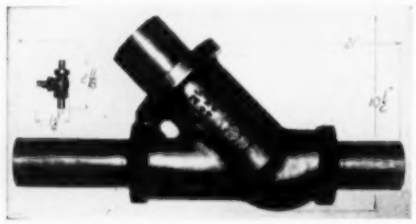

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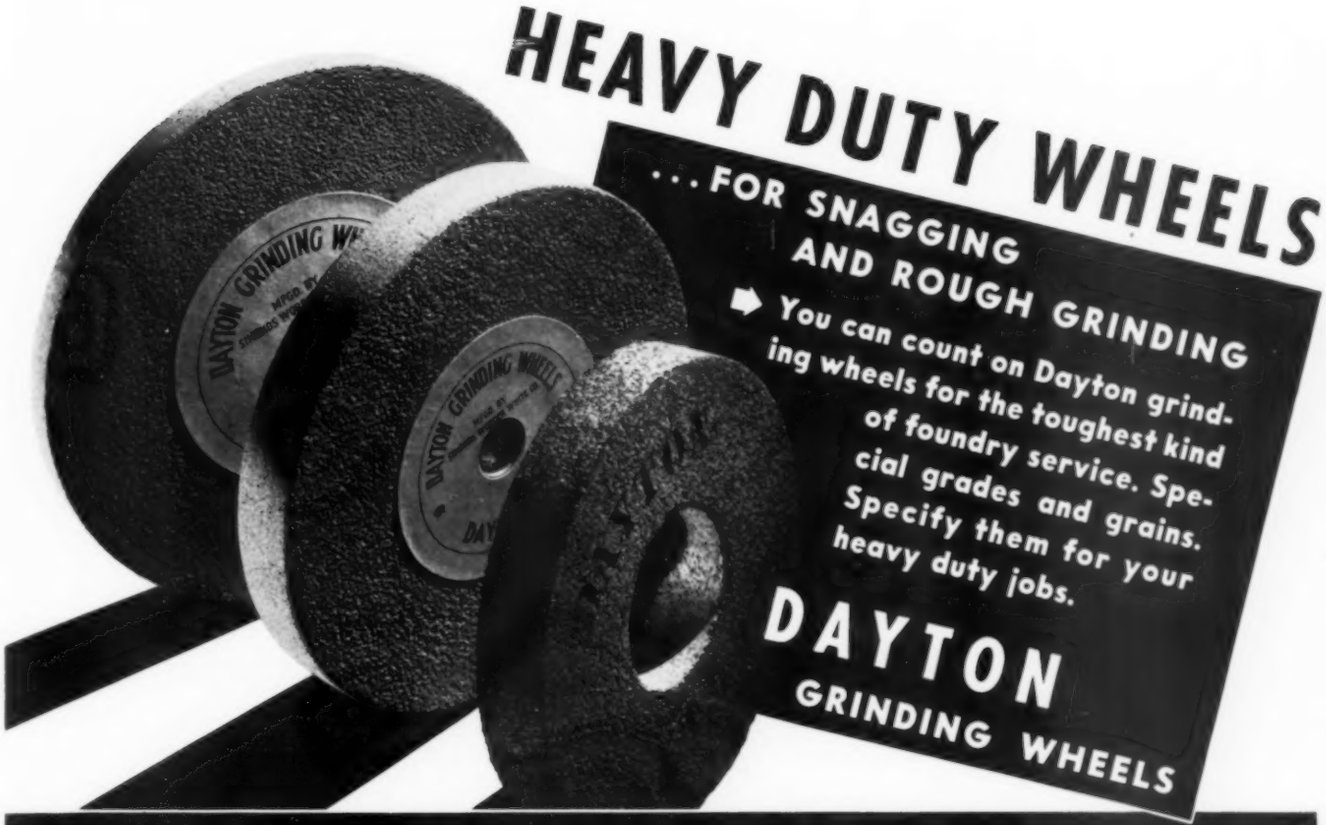
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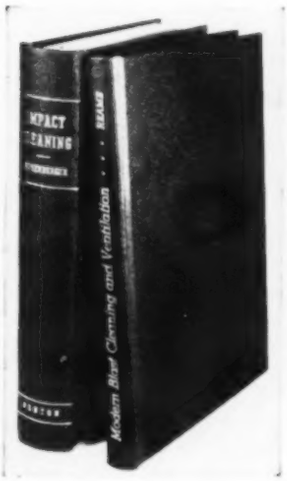

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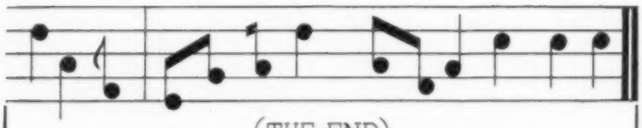

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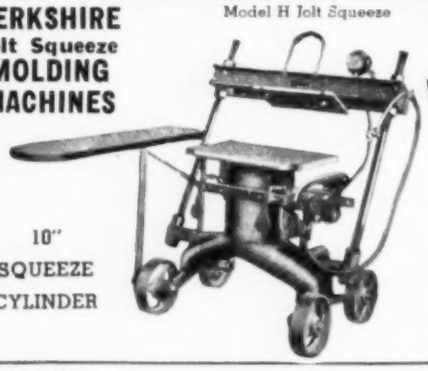

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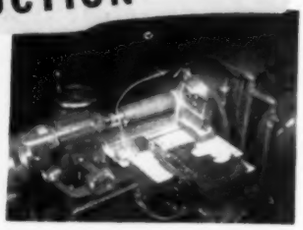

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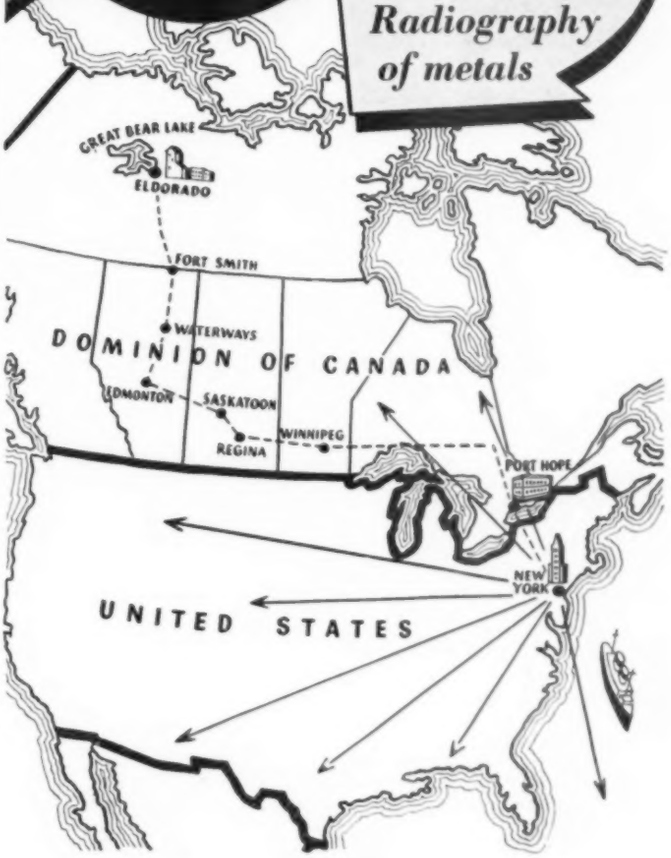

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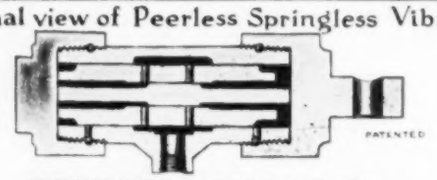

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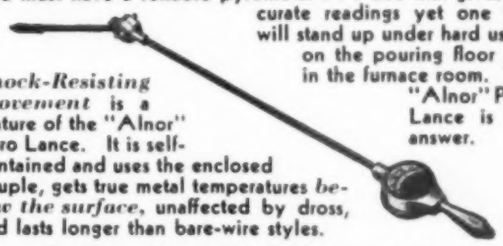

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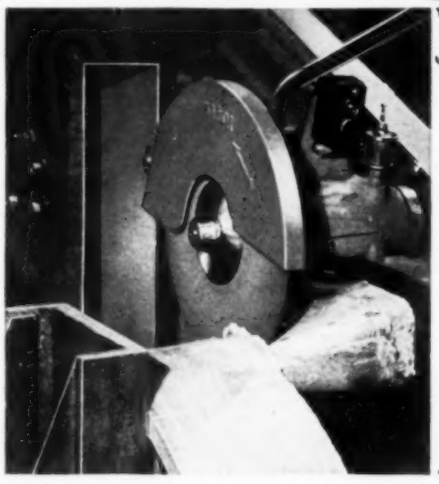

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Midwestern corporation wants man experienced in all phases of magnesium and aluminum aircraft castings, including heat treating of magnesium and all aluminum alloys. Must be familiar with sand and practice for aluminum and magnesium cores; able to manage and instruct in melting and pouring of aluminum and magnesium; able to manage cleaning room; should have thorough knowledge of pattern design and engineering and must be able to work on engineering problems with aircraft engineers. Also, should be able to carry out all operations from blueprints to finished castings and be familiar with Government specifications and able to produce satisfactory X-Ray castings. In replying give full details of experience and amount of each phase, age, position if in Defense plant, copies of references from previous employes, citizenship and salary expected. Address Box 808, The FOUNDRY, Cleveland.

WANTED—CHIEF METALLURGIST

Responsible position with assurance of permanence. Middle West steel foundry. Must have had experience in steel casting field. Both control and research. References required. Excellent opportunity. Address Box 764, The FOUNDRY, Cleveland.

BRASS FOUNDRYMAN WANTED

EXECUTIVE ABILITY AS MANAGER FOUNDRY DAILY CAPACITY 4000 POUNDS. MANUFACTURERS OF VALVES, FITTINGS, ETC. ADDRESS BOX 820, The FOUNDRY, CLEVELAND.

EXPERIENCED COREROOM FOREMAN

Wanted who is thoroughly familiar with rigging and operating blowing machines to produce cores for nonferrous castings. Address Box 810, The FOUNDRY, Cleveland.

CLASSIFIED RATES

Position Wanted: 5c per word, minimum $1.50. Help Wanted: 6c per word, minimum $3.00. All other type advertisements: 10c per word, minimum $3.00. Copy should be received not later than 13th of month preceding date of issue. Address: The FOUNDRY, Penton Building, Cleveland.

Help Wanted

JUNIOR METALLURGIST WANTED

Recent graduate, more inclined towards production than research. Our output 100% for the war.

THE DURALOY COMPANY
Scottdale, Penna.

SALESMAN

Wanted for old established foundry supply and equipment company in Pacific Northwest. Must be draft exempt. Give age, experience, references, and salary expected. Address Box 802, The FOUNDRY, Cleveland.

FOREMAN WANTED

FOR MODERN FOUNDRY MAKING MEDIUM AND LIGHT WEIGHT CASTINGS FOR OWN USE IN ENGINE MANUFACTURE. FIFTY EMPLOYES, OPEN SHOP. STATE AGE, EXPERIENCE, DRAFT CLASSIFICATION AND STARTING SALARY. ADDRESS BOX 824, The FOUNDRY, CLEVELAND.

MELTER ON ELECTRIC STEEL FURNACE

Melter's helper interested in becoming first-class melter. Foundry in East. Address Box 825, The FOUNDRY, Cleveland.

METALLURGIST

With experience on medium and heavy gray iron castings. Responsible position with good future in large middle west foundry. Give complete details. Address Box 829, The FOUNDRY, Cleveland.

Positions Wanted

PRACTICAL FOUNDRYMAN

Desires a position as Foundry Superintendent. Thirty years' experience handling foundries and men on all classes of work, heavy and light. Four years in steel, good rigger for production. Best of references furnished. Address Box 823, The FOUNDRY, Cleveland.

EXPERIENCED MALLEABLE FOUNDRYMAN

From molder to owner. Age 56. Knowledge of many plants. Developer of high silicon, low carbon, high tensile, elongation, fluid as gray iron. Received many letters showing results; proved by large plant through mail instructions. Change nothing but mixture. Will instruct inexperienced, be valuable in position of knowing how. Personal service or by mail. Address Box 814, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Thirty years' foundry experience of which has been superintendent and general foreman for twenty years on jobbing machinery, castings, and practical foundryman in every detail. best reference. Address Box 826, The FOUNDRY, Cleveland.

YOUNG METALLURGIST

Experienced in the production of acid electric carbon and alloy steel castings and supervision of laboratory, gamma-raying and heat treatment of castings. Address Box 804, The FOUNDRY, Cleveland.

SUPERINTENDENT

Malleable foundry. Age 46. Technical education. Practical foundryman in all departments. Address Box 818, The FOUNDRY, Cleveland.

GENERAL MANAGER

With approved record in successfully managing and building up foundry, machine and allied industries, desires position requiring dependable qualifications and service. Ability to efficiently direct all office, sales, financial and creative activities and produce consistent profits unquestionably established by previous experience. Address Box 747, The FOUNDRY, Cleveland.

Classified Advertising

Positions Wanted

WOOD PATTERNMAKER

DESIRES TO MAKE A CHANGE. AGE 50. THIRTY-FIVE YEARS' EXPERIENCE. NOW EMPLOYED AS SHOP FOREMAN IN MEDIUM SIZE JOB SHOP. PREFERS TO REMAIN SAME CAPACITY. ABLE TO GO ANYWHERE. ADDRESS BOX 822, THE FOUNDRY, CLEVELAND.

STEEL FOUNDRY SUPERINTENDENT

Twenty-two years' experience, carbon and alloy castings. Ability to produce quality, and quantity. American, 42, practical mechanic, technically trained, and years of proven success. Available immediately. Address Box 821, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Practical and technical training. Seventeen years' experience, light and heavy castings, green and dry sand molds. Mix by analyses, use the McLain's system. Professional draftsman and designer with time study and cost analyses. Can guarantee a maximum production at a minimum cost. Prefers Middle West. Now located in Iowa. Address Box 800, The FOUNDRY, Cleveland.

MECHANICAL ENGINEER

Age 36, graduate. Thirteen years' experience in all phases of steel mill and foundry plant engineering and maintenance. Desires position as Plant Engineer with progressive company in East. Now employed. Minimum salary $6000. Address Box 752, The FOUNDRY, Cleveland.

METAL PATTERNMAKER

Experienced in bench or machine work, small work prefered. Executive ability in patternshop and nonferrous foundry. Well versed in all kinds of pressure plaster castings and pressure cast match plates. Address Box 561, The FOUNDRY, Cleveland.

FOUNDRY FOREMAN

Desires position in brass or magnesium foundry. Seventeen years' experience as molder on jobbing and production work. Can rig and produce, good handler of men. Address Box 783, The FOUNDRY, Cleveland.

NIGHT SHAKEOUT FOREMAN

Experienced on small and large castings; mixes facings and conditions sands. Takes care of core ovens and mixes core sands. Is able to handle help and arrange work. Can take full charge of chipping and cleaning castings, cast and semisteel castings. Address Box 763, The FOUNDRY, Cleveland.

BRASS FOUNDRY FOREMAN

Practical experience including steam valves, high pressure castings, bronze die molds, general jobbing and production work. Address Box 817, The FOUNDRY, Cleveland.

Employment Service

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

Employment Service

SALARIED POSITIONS
$2,500 to $25,000

This advertising service of 32 years' recognized standing negotiates for positions of calibre indicated. Procedure individualized to your personal requirements. Retaining fee protected by refund provision. Identity covered. If salary has been $2,500 or more send for details.

R. W. BIXBY, INC.
101 Delward Bldg. Buffalo, N. Y.

Wanted-To-Buy

WANTED TO BUY

1300 to 1500 air compressor, or enough compressors to make 1500 ft. air. Also 150 KW 2300—250 V motor generator.

WANTED TANKS

12—10,000 gal. cap. or larger tanks to total 120,000 gal. cap.

RUSSELL STANHOPE,
Darien, Conn.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

WANTED AT ONCE

1—250 pound to one ton electric melting furnace. Address inquiries stating full particulars to **Hi-Alloy Castings Company, P. O. Box 193, New Brighton, Pa.**

WE WANT TO BUY

Several large steel castings, AA-1 priority for Army and Navy. Weight approximately 7 tons each, size 14" x 8' x 14'. Immediately communicate with:

THE BROWNING CRANE & SHOVEL CO.
16226 Waterloo Rd. Phone: IVanhoe 1400
Cleveland, Ohio

Foundries for Sale

MALLEABLE AND GRAY IRON FOUNDRY TWO YEARS OLD

Foundry two years old,
50 by 160 ft. on two acres in
Denver, Colorado,
Completely equipped.
Large going business; owner drafted.

BARCLAY IVINS
Denver, Colorado

FOR SALE

Brass and aluminum foundry, near Milwaukee doing good profitable business. Owners wish to retire. Requires $45,000 cash. Address Box 806, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY FOR SALE

In Detroit area. Operating to near capacity. 16,500 square feet floor space. Has excellent organization. In good labor area. Good earning record and background.

IRVING N. ALLEN
Dime Bank Building Detroit, Michigan

For Sale

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
406 N. Peoria St. Chicago, Ill.

FOR SALE

International molding machine. Size 26" x 8' long, type G, jolt ramming power turnover model. Serial No. 31830. In good working order. Address Box 827, The FOUNDRY, Cleveland.

FOR SALE

2—No. 112 Milwaukee jolt squeeze strippers
2—No. 11-32 Nichols jolt squeeze strippers
2—Arcade "Modern" squeezers

CHAMPION FOUNDRY & MACHINE CO.
1314 West 21st St. Chicago, Ill.

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEAM—368 ft., 500 ft., 800 ft., 1221 ft., 1640 ft., 2200 ft., & 3000 ft.

DIESEL—368 ft., 603 ft., 900 ft. & 1300 ft.

GASOLINE—110, 160, 220, 310, 1300 ft.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

FOR SALE

(1) 3-ton Heroult furnace complete except for controls and transformer.

(2) 1000 lb. Detroit rocking type electric furnace complete with 300 KVA 4600 volt transformer and panel board.

Address Box 671, The FOUNDRY, Cleveland.

FOR SALE

1—Pangborn barrel type sand blast, size 24" x 28", capacity 1500 lb. per hour. Can be seen in operation. Delivery November 1. Price $400.00.

1—Comet electric hoist, one ton capacity. Immediate delivery. Price $125.00.

1—Campbell Hausfeld style 600—brass melting furnace, with Maxon Premix unit. Less motor and lining. Immediate delivery. Price $250.00.

ROCK ISLAND METAL FOUNDRY
Rock Island, Illinois

Classified Advertising

For Sale

REBUILT COMPRESSORS AND BLOWERS

1250 CFM, @ 3¼ lbs., 3600 RPM Gen. Elec. with 30 H.P. A.C. motor drive.
(3) Buffalo Forge Pressure Blowers, 1200 cfm @ 11 oz., 9½" inlet, 7 x 7 outlet, driven by 7½ H.P. A.C. Motors.
450 CFM, 3500 RPM Gen. Elec. with 6.2 H.P. A.C. motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

The Motor Repair & Mfg. Co.
1552 Hamilton Ave. Cleveland, Ohio

FOR SALE

1 Green positive blower with 50 h.p. motor, dust collector unit, molding machine, electric welder, 50 h.p. motor 900 r.p.m. Write for complete list.

E. A. MEYER
Green Bay, Wisconsin

EQUIPMENT IN STOCK
GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—Young Bros. Gas Fired Core Oven, 12' 6" deep x 8' wide x 7' 6" high, double doors one end, 4" insulation complete with burner, flues and pyrometer.
(1)—1¾" cap. Shuster Power Sprue Cutter.
(4)—large flask vibrators.
(1)—10-HP. Black & Decker, double end 230-VDC Grinder, capacity 24" wheels.

AIR COMPRESSORS & BLOWERS

(1)—Ing.-Rand XCB, 2-stage, 9¼ x 12 x 15 x 12, 100-HP. motor, 220-/3/60-cycle.
(1)—12 x 12 Chicago N.S.B. 375-CFM. @ 100 lbs. with idler, unloader and lubricator.
(1)—12 x 10 Penna. 365-CFM. @ 100 lbs. belt drive, 60-HP. C.W. slip ring motor, 220/3/60-cy.
(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.
(1)—Spencer Turbo Blower, 1300-CFM. @ 16-oz. 10-HP. motor, 220/3/60-cy. 1760 RPM.

MELTING EQUIPMENT

(1)—350-lb. Detroit Electric Furnace complete with 100-KVA. 2300 volt transformer, two boxes electrodes, (used six months).
(2)—3500 lb., 6000 lb. Ladles, worm geared, crane type bail (excellent condition).

SPECIAL: 6-ton Heroult Furnace complete with all electrode motors, tilting motor, electrical equipment and (1)—1500-KVA and (1)—800-KVA G.E. transformer, 13200/3/60-cycle on primary, control equipment, panel, etc.

ELECTRIC MONORAIL HOISTS

(30)—½ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 230/440-volts, 3-Ph. 60-CY, 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1) to 50-tons cap. 18' 0" to 91' 0" span, 220/440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 Clarissa St. Philadelphia, Pa.

For Sale

FOR SALE

4—International type G portable molding machines.
3—No. 2 Demmler core blowers.
6—Nicholls molding machine, 14"—36 Type D
3—Tabor power squeeze molding machines.
1—Milwaukee molding machine.
1—Royer sand separator.
1—U. S. Molding machine.

This equipment out of our line will sell cheap to move.

VICTOR MACHINERY COMPANY
132 S. Clinton Street Chicago, Ill.

FOR SALE

One bottom dumping sand bucket with a capacity of 2½ tons; made by Link-Belt; used two years, in excellent condition. **Grand Rapids Foundry, 548 Bond Avenue, N. W., Grand Rapids, Michigan.**

FOR SALE

One No. 6 Piqua positive pressure blower, 20" x 60"—35 ft. displ. top discharge, mounted on bed-plate direct connected to 40 h.p. Wagner 3/60/220 A. C. motor, with starter . . . used.

Address Box 760, The FOUNDRY, Cleveland.

FOR SALE

Herman rollover and bumper, size 60 x 72. **The Cooper-Bessemer Corporation, Mount Vernon, O.**

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo, Mich.

FOR SALE

36" x 10' rotary dryer with drive and equipped with a size 25 Buffalo type E mill exhauster driven by a Reeves variable speed transmission directly connected to a Westinghouse 2 h.p. 3 phase 220-440 volt motor. Equipment includes a higher pressure gas burner and duct from the dryer to the exhaust fan and about 30 ft. of stack; capacity of the dryer 6 to 10 tons per hour. Address Box 753, The FOUNDRY, Cleveland.

FOR SALE

Brass furnace, James Jones make, rotary-tilting, manually operated. Direct flame with oil burner attachment, capacity 750 lbs. Good condition. Price $400.00 f.o.b. Los Angeles, California. Address Box 819, The FOUNDRY, Cleveland.

FOR SALE

One 48" cupola, complete with blower.
One 60" cupola, complete with blower.
Write or call for further information.
Saginaw Foundries Company, 930 S. Water Street, Saginaw, Michigan.

FOR SALE

Used Pangborn 3 cu. ft. revolving drum sandblast including air tank.

A-B Stoves, Inc.
Battle Creek, Michigan

For Sale

FOR SALE

1—Tabor Plain-Jarring machine, Model B-18, Table Size 54" x 96", 13,000 lb. capacity. Practically new.
1—Robbins & Myers 5-ton hoist with plain trolley and magnetic control panel. 440 volt, 60 cycle.
1—Piqua 19 cu. ft. positive pressure blower with flexible coupling gear drive mounted on cast iron base.
1—No. 1002 Spencer-Turbo Compressor, 250 C.F.M. direct connected, 2 h. p., a. c. motor.

THE ST. MARYS FOUNDRY COMPANY
St. Marys, Ohio

USED FOUNDRY EQUIPMENT
FOR SALE

12—Large sprue buckets
12—Industrial narrow gauge flat cars
24—Steel tilting dump boxes
2—Narrow gauge dump cars
Air compressor storage tank
Several blowers

OWOSSO IRON & METAL COMPANY
701 S. Cedar St. Owosso, Michigan

FOR SALE

Monarch continuous revolving oil furnace Series 145, Capacity 500 lb. With 5 h.p., 220 volt, 3 phase, 60 cycle, 520 ft. blower.

Francis Keil & Son, Inc.
401 E. 163rd St. New York, N. Y.

SPECIAL DEFENSE BARGAINS

Air Receivers up to 42" dia.

60" Cupola stack sections only.

Air Compressor Unit—8½ x 12 Worthington Vee Belt drive with receiver, starter unloader etc. complete unit, 40 HP 3-60-220 motor.

Fans—Blowers—Exhausters for cooling, ventilation, dust or fumes removal.

Fan or **Centrifugal** style blowers—Maxon-Premix—from No. 0 to No. 4. Spencer Turbine, Am. Blower Co., Sturtevant, Buffalo, Clarage, Ilg etc. for Gas or Oil fuel Combustion.

Rotary Pressure Blowers—Roots-Connersville, Garden City, Green, Piqua, Sturtevant, Am. Gas Furnace Co. etc. Send specifications.

Furnaces for Brass and Aluminum Melting—2—No. 2 U. S. Rotary Melting Furnaces—Normal capacities increased 50% in lengthened melting chambers. Hausfeld 2000 lb. barrel type with No. 6 Maxon-Premix gas burner.

Hausfeld Tilting open flame 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Molding Machines—Osborn No. 404-S, Pit Type jolt-stripper. "Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze. "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock. Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen. Tabor—Hand operated, portable Air Rollover 12" draw for 24" x 30" flasks or core boxes.

3—Crane Ladles, 2-3-4 tons capacity.

1—25 H.P. Diesel Engine, horizontal.

1—Beardsley & Piper Gyratory sand screen size 36" x 59"—1 H.P. Ball Bearing 3/60/220 A.C. Motor, Vee Belt Drive.

Sand Blasts—pressure generator tanks with hose & nozzles, Sly wet Cinder mill.

Sand Blast Barrel—New Haven 36 x 46" for Motor direct connected, without motor.

Sand Blast Table—Pangborn 8' dia. with operators room and pressure generator tank.

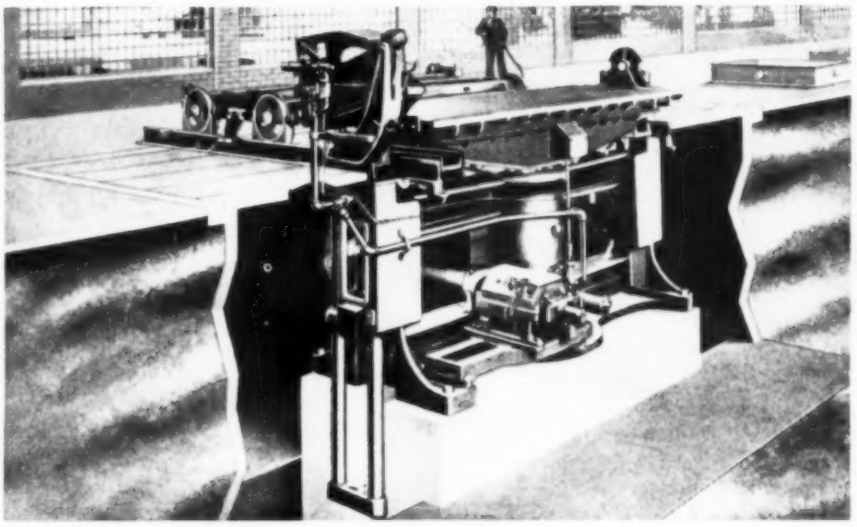
Tell us your needs.

CLIFTON MACHINERY CO.
1023 W. 6th, CINCINNATI, O.

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

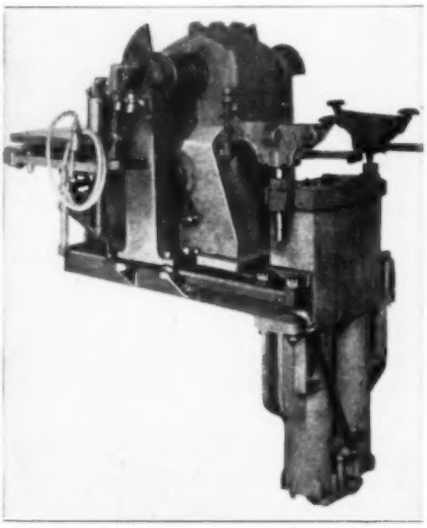
OSBORN MOLDING MACHINE



No. 513-E Osborn Air Jolt and Electric Rollover pattern draw and Run-out Car, flasks length O/A 124" width 72"—capacity, width of roll-over table 60"—pattern draw 30"—capacity @ 80 lbs. pressure 12,000 lbs. equipped with 15 HP AC Motor.

INTERNATIONAL MOLDING MACHINES

1 49 x 16" draw Type "F," fitted with air equalizers, rollers in the draw section and hand operated core box clamps, jar plate 100" long, 6000 lbs. cap.



INTERNATIONAL TYPE "F"
(Enclosed Model)

48 x 16" draw Type "F"—4200 lbs. cap. @ 80 lbs., table size 48 x 83".
36 x 16" Type "F" (double cyl. open type) 3000 lbs. cap. @ 80 lbs. press. 36 x 48" table.

EXHAUST TUMBLING BARRELS

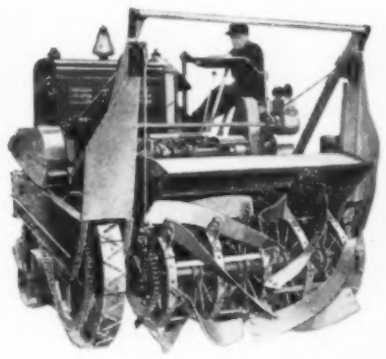
Sly 30" dia. x 50" long 9/16" plate, 18 x 22" door opening.

24" dia. x 48" long, ⅝" plate renewable trunnions.

34" dia. x 74" long ⅞" plate Whiting, renewable trunnions.

36" dia. x 72" long Sly, ⅞" plate renewable trunnions complete with 5 HP 3/60/220V AC Motor.

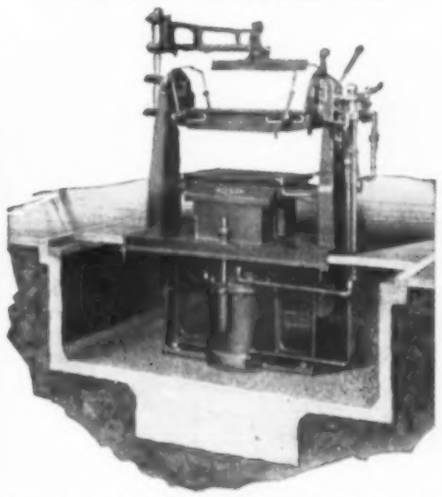
AMERICAN SANDCUTTERS



Model "AA" size 72, 60" cutting cyl. 72" between tractor wheels, with 7½ HP 220V AC Motor, Cable and Reel.
Cleveland Model "B" Type 5-55, 55" spiral cutting cyl. 26" dia.—66" between tractor wheels, equipped with 3 Cleveland Elec 220V AC Motors, Cable and Take-Up Reel.
Model "K" size 84"—72" cutting cyl. 84" between tractor wheels, 6" face, equipped with 30 HP Westinghouse 3/60/220V AC Induction Motor, Cable and Take-Up Reel.
Model "K"—84" spiral cutting cyl. 36" dia.—92" between tractor wheels, 5" face, equipped with 3—220V AC Motors, Cable and Take-Up Reel.

NO. 2 DEMMLER
CORE BLOWING MACHINES

OSBORN Molding Machines



No. 332, jolt roll-over and squeeze with roller conveyor attachment, flask cap., max. length 36" width 26" pattern draw 9"—750 lbs. cap. @ 80 lbs.

No. 333, flask cap. max. length 45" width 32" —pattern draw 11", 1400 lbs. cap. @ 80 lbs. press. squeeze cyl. dia. 19".

GRIMES—MILWAUKEE

Grimes Model K-614 roll-over, 6" cyl. 1000 lbs. cap. @ 80 lbs. max. width of flask 32" max. length 48"—14" pattern draw.

No. 832 Milwaukee hand jolt and roll-over, foot draw, portable, 30" height pattern table, max. draw 8" 15 x 32" table.

JOLT SQUEEZE & STRIP POWER

No. 142 Milwaukee, stationary, stripping cap. 1200 lbs. @ 80 lbs. press., draw 6" table 19 x 35"—open end type.

No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary, length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolt. cap. @ 80 lbs. pressure, distance from lifting frame to squeeze head 24¼", flask length 44½", with roll off conveyor.

No. 703-5 Osborn, same as above excepting 17 x 35" table.

OVERHEAD ELECTRIC TRAVELING CRANES

Whiting BUCKET HANDLING DOUBLE DRUM CRANE 4-motor type, cage operated, 230V DC Motors, Drum Type Cont. 18'8" span, 7'0" track gauge, end trucks 15'0" wheel base.

3-ton MILWAUKEE 3-motor Type "C" GANTRY CRANE (suitable for 5-tons) 230V DC Motors, lattice type girders, 31'6" span, 25 ft. lift, overhang on each side approx. 12 ft., single drum parallel with bridge girders.

35-ton Morgan, 36 ft. span Power House Type 4-motors, 600V DC Motors, with Aux. Hoist.

25-ton Walker 55 ft. span with 5-ton Aux. 550V DC Motors, girders single web const. truck ends with large steel wheels, chain on main drum, 3-motors.

5-ton Shepard Class "B" 18'5" span, 1-motor, floor control, 6 HP 220V DC, trolley hand racked, bridge hand racked.

1 ton Detroit Ice House Type "H" 29 ft. span, "I" Beam Bridge Type Girders, 3-motors, 3/60/220V AC, floor oper. 10 ft. lift.

SCULLY MACHINERY & EQUIPMENT CORP.
(Formerly—Foundry Division of Scully-Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

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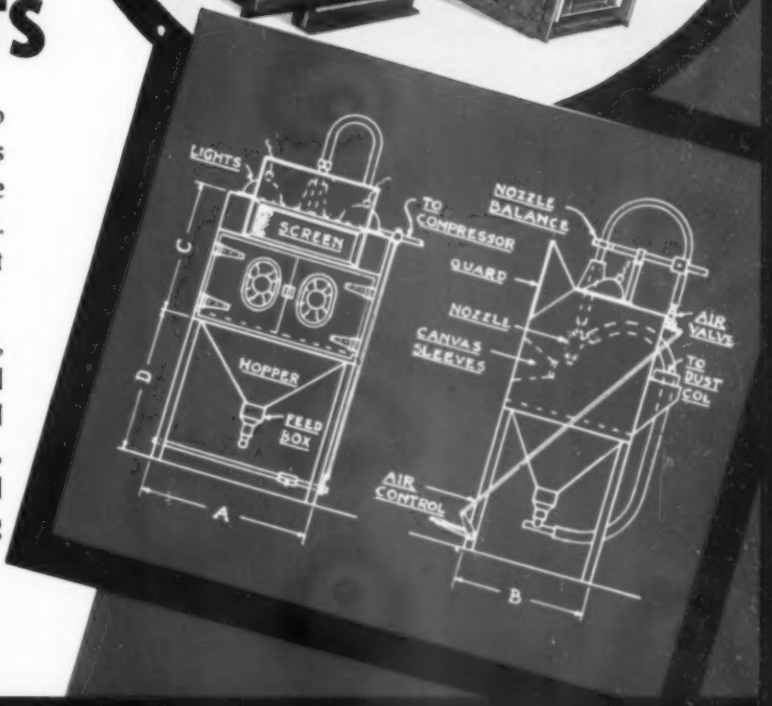

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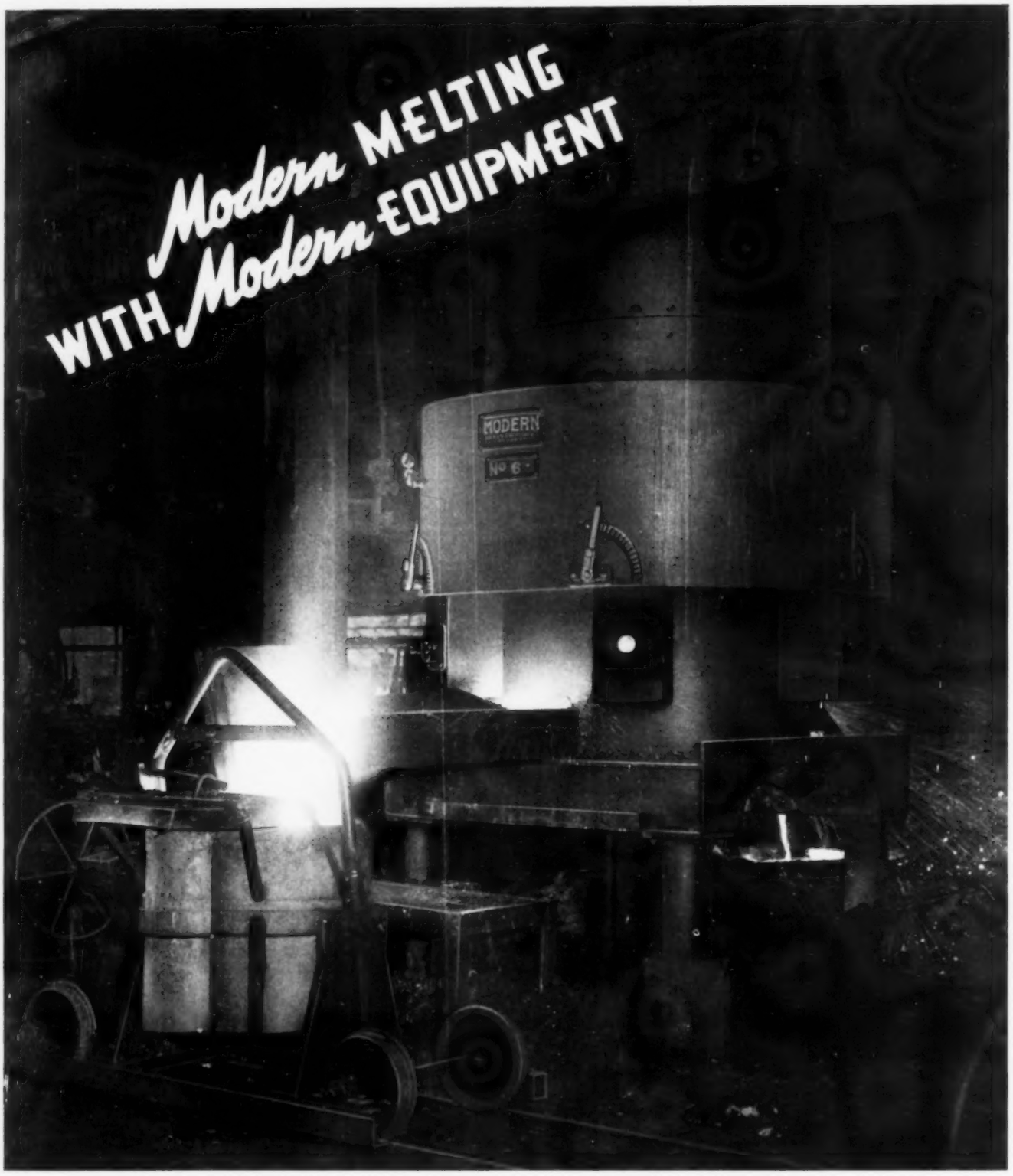

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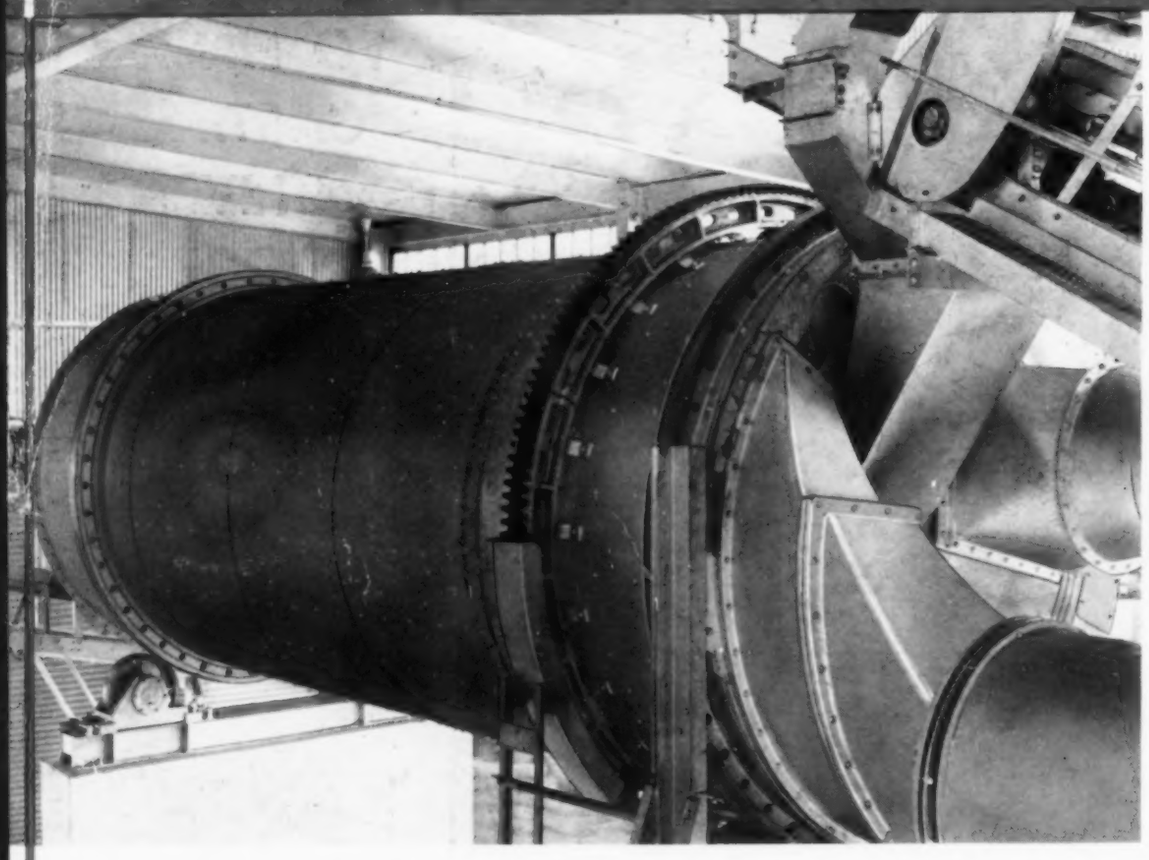

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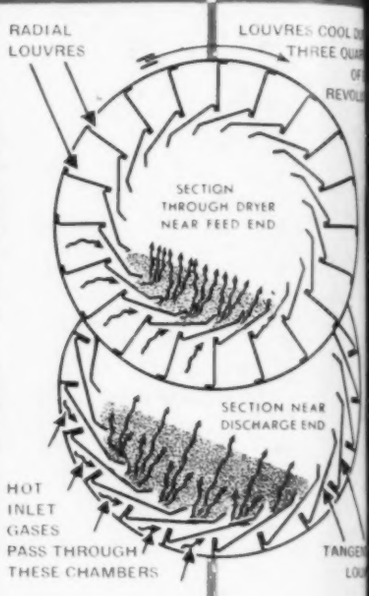
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